INTERIM RECORD OF DECISION AMENDMENT

SAN GABRIEL VALLEY SUPERFUND SITE
WHITTIER NARROWS OPERABLE UNIT
LOS ANGELES COUNTY, CALIFORNIA

November 1999

United States Environmental Protection Agency
Region IX - San Francisco, California

Contents

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PART I
DECLARATION

Part I - Declaration

1.1 Site Name and Location

This Interim Record of Decision (ROD) Amendment addresses groundwater contamination at the Whittier Narrows Operable Unit (WNOU) located within the San Gabriel Valley Superfund Site, Area 1 (CAD980677355) in Los Angeles County, California.

1.2 Statement of Basis and Purpose

This ROD Amendment presents the selected remedial action for the WNOU of the San Gabriel Valley Superfund Site in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9601 et. seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (collectively referred to herein as CERCLA) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300 (NCP). This decision is based on information contained in the Administrative Record for this site.

The State of California, acting through the California Department of Toxic Substances Control (DTSC) and the Los Angeles Regional Water Quality Control Board (RWQCB), concurs with the selected remedy.

1.3 Assessment of the Site

EPA has determined that volatile organic compounds (VOCs) and other contaminants have been released into groundwater upgradient and within the WNOU, and that a substantial threat of continued migration of contamination into the WNOU still exists.

The response action selected in this ROD Amendment is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of the Selected Remedy

The selected remedy addresses chemical contamination of groundwater originating from industrial activities in the San Gabriel Basin. EPA's objective for the remedy is to protect human health and the environment, including the groundwater resource in the down-gradient Central Basin. Major components of the selected remedy include:

- Groundwater containment through extraction at or near the downgradient limit of contaminant concentrations exceeding Maximum Contaminant Level (MCLs) or other relevant and appropriate standards. This location is near Whittier Narrows Dam;

- Groundwater treatment at a treatment facility (or facilities), using air stripping with vapor-phase granular activated carbon adsorption for off-gas treatment and, potentially, liquid-phase granular activated carbon adsorption treatment. Other treatment technologies may be evaluated during remedial design;
- If 1,4-dioxane concentrations in the extracted groundwater exceed the State action level, additional or alternative treatment facilities using technologies such as ultraviolet oxidation may be required;
- Conveyance systems (i.e., pipelines, booster pumps) to transport contaminated groundwater from the wells to the treatment plant and treated water from the plant to the designated end use;
- Treated water end-use by local water purveyors or, as a secondary option, recharge of the treated water back to the aquifer using existing Montebello Forebay or other spreading facilities;
- Groundwater monitoring to help optimize system design, measure the performance of the containment system and provide early warning of upgradient conditions that could affect the system.

The WNOU is one of several OUs EPA has designated at the San Gabriel Valley Superfund Sites. EPA is considering or implementing remedial actions individually in each OU to address contaminated groundwater found in that OU. The WNOU is the furthest downgradient OU in the San Gabriel Basin and encompasses the only location where contaminated groundwater can migrate out of the San Gabriel Valley.

1.5 Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, is cost effective and utilizes permanent solutions to the maximum extent practicable. The selected remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility or volume of materials through treatment).

This interim remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 ROD Data Certification Checklist

The following information is presented in the Decision Summary section of this ROD Amendment. Additional information can be found in the Administrative Record file for this site.

- Chemicals of concern (COCs) and their respective concentrations

- Baseline risk represented by the COCs
- Containment objectives established for the COCs and the basis for these objectives. Final cleanup levels are not included because the selected remedy is an interim remedy to contain groundwater contamination.
- Current and future groundwater use assumptions used in the baseline risk assessment and ROD Amendment
- Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected.
- Decisive factors that led to selecting the remedy (i.e., how the Selected Remedy provides the best balance of tradeoffs with respect to the Superfund evaluation criteria).

Keith A. Takata

Keith A. Takata
Director of Superfund Division
U.S. Environmental Protection Agency, Region IX

11-10-99

Date

PART II
DECISION SUMMARY

Part II - Decision Summary

This Decision Summary portion of the Interim Record of Decision (ROD) Amendment summarizes the information and approaches that the U.S. Environmental Protection Agency (EPA) used to reach a decision on this remedy. It also summarizes the remedy that EPA has selected.

1 Site Name, Location and Description

This ROD Amendment presents the selected remedial action to address groundwater contamination at the Whittier Narrows Operable Unit (WNOU) located within the San Gabriel Valley Superfund Site, Area 1 (CAD980677355) in Los Angeles County, California. EPA is the lead entity for this OU.

The WNOU encompasses approximately four square miles and is located in the southern portion of the San Gabriel Basin (Figure 1). Whittier Narrows is a 1.5-mile gap in the low-lying hills that separates the San Gabriel Basin and the Central Basin and represents the primary discharge point for groundwater and surface water flow exiting the basin. EPA designated Whittier Narrows as an OU specifically to address groundwater contamination flowing out of the San Gabriel Basin, through Whittier Narrows, into the Montebello Forebay portion of the Central Basin. The WNOU is bounded to the north by the South El Monte OU at the Pomona Freeway (Highway 60), and to the south by the Montebello Forebay portion of the Central Basin near the Whittier Narrows Dam.

Groundwater flow in the WNOU is principally from northeast to southwest from the San Gabriel Basin into the Central Basin. There are shallow, intermediate, and deep drinking water and irrigation wells located within Whittier Narrows and immediately south within the Central Basin. Most of the WNOU is undeveloped land dedicated to flood control and outdoor recreational uses. Densely populated residential, commercial and light industrial areas surround the WNOU. This includes extensive industrial areas in the immediately upgradient South El Monte OU. Industrial activities within the WNOU are generally limited to the far eastern portion of the Narrows.

2 Site History and Enforcement Activities

2.1 Site History

The San Gabriel Valley has been the subject of environmental investigation since 1979 when groundwater contaminated with volatile organic compounds (VOCs) was first identified. Subsequent investigation by EPA and others revealed the extent of groundwater contamination in the aquifers of the San Gabriel Valley (the San Gabriel Valley groundwater system is known as the San Gabriel Basin). In May 1984, four broad areas of contamination within the basin were listed as San Gabriel Areas 1 through 4 on EPA's National Priorities List (NPL). The WNOU is officially part of the San Gabriel Valley Area 1 Superfund Site. EPA subsequently divided the basin into eight operable units (OUs) to provide a means of planning remedial activities in the basin. The term "Operable Unit" (OU) is used to define a discrete action that is an incremental step toward a comprehensive site remedy. Operable units may address certain geographic areas, specific site problems, initial phases of a remedy, or a set of actions over time. The WNOU is one of eight OUs within the San Gabriel Valley Superfund Site (Figure 1). The other OUs identified by EPA are Alhambra, Baldwin Park, El Monte, Puente Valley, Richwood, South El Monte and Suburban.

The groundwater contamination in the San Gabriel Basin results from the historic use and improper handling and disposal of tetrachloroethene (PCE), trichloroethene (TCE), and other chemicals. These chemicals were used in large quantities at industrial facilities across much of the San Gabriel Valley as early as the 1940s, and by hundreds of businesses in the 1960s, 1970s and 1980s for degreasing, metal cleaning, and other purposes. The chemicals were probably released to the ground by a combination of disposal, careless handling, leaking tanks and pipes, and other means.

EPA conducted Remedial Investigation/Feasibility Study (RI/FS) activities in the WNOU beginning in the late 1980s. The RI/FS approach is a methodology that the Superfund program has established for characterizing the nature and extent of risks posed by uncontrolled hazardous waste sites to evaluate potential remedial options. The RI serves as a mechanism to collect data for site characterization. The FS serves as the mechanism for development, screening, and evaluation of potential remedial alternatives.

An Operable Unit Feasibility Study (OUFS) Report for the WNOU was completed and issued for public review in September 1992 (EPA, 1992b). At that time, contaminant concentrations were low and posed a minimal threat to human health and groundwater supplies in the Central Basin. In March 1993, EPA issued a ROD that called for installation of wells and additional sampling to supplement the existing groundwater monitoring program.

For several years, contaminant concentrations were relatively low throughout Whittier Narrows and groundwater resources in the Central Basin were not threatened. However, in the last few years, contaminated groundwater from upgradient areas has been migrating into the western side of Whittier Narrows causing significant increases in contaminant concentrations. The extent of contamination in the WNOU is discussed in Section 5. The increases in contaminant

concentrations suggest an imminent threat to groundwater resources in the Central Basin. This threat prompted EPA to initiate additional data collection activities and evaluation of active remedial actions.

In 1997, EPA initiated additional groundwater monitoring and further characterization of the hydrogeology in western Whittier Narrows. Since then, nineteen new monitoring wells were installed (EPA, 1997a and 1999a). In addition, large-scale aquifer tests were conducted using City of Whittier, Pico Rivera, and Texaco production wells (EPA, 1997b). Results of EPA's recent investigations in Whittier Narrows are presented in the Site Characterization Report for Whittier Narrows (EPA, 1998a).

An FS Addendum was performed for the WNOU in 1998. The FS identified remedial action objectives, assembled remedial alternatives, and provided an evaluation of the alternatives with nine evaluation criteria that EPA established. EPA issued the Final FS Addendum Report (EPA, 1998b) and a Proposed Plan in October 1998.

2.2 Enforcement Activities

EPA has not found any significant sources of contamination within the western portion of the WNOU. The VOC contamination present in western Whittier Narrows is migrating into the OU from upgradient contaminant sources, primarily from the South El Monte OU.

The South El Monte OU is located north of the Pomona Freeway (Figure 1). There is extensive industrial activity in the South El Monte OU and EPA has identified approximately 50 parties that are potentially responsible for the groundwater contamination in the area. As part of site investigation activities, over 200 groundwater-monitoring wells have been installed at industrial facilities. Data from these monitoring wells confirm that a significant number of distinct, individual sources of groundwater contamination are present in the South El Monte OU. Groundwater flow directions and the distribution of contamination in the area suggest that the majority of shallow and intermediate VOC contamination present in the western portion of Whittier Narrows emanates from the South El Monte OU.

The South El Monte Participants (a group of Potentially Responsible Parties [PRPs] performing work in the South El Monte OU under EPA direction) have completed a Feasibility Study which evaluates alternatives for shallow and intermediate zone groundwater control in the South El Monte OU. EPA has issued a Proposed Plan for the South El Monte OU which selects, as the preferred alternative, a remedial action to contain contamination migrating west of the South El Monte OU. The preferred alternative would not contain contamination migrating into the Whittier Narrows OU.

At this point, the remedial action identified in this ROD Amendment for the WNOU will be implemented as a fund-lead action performed by EPA. However, EPA will evaluate its ability to recover response costs for the WNOU from upgradient sources.

3 Community Participation

The Proposed Plan for this remedy, in the form of a fact sheet, was distributed to the parties on EPA's mailing list for the WNOU in October 1998. The Proposed Plan, together with the Whittier Narrows Operable Unit Feasibility Study Addendum (EPA, 1998b) and other pertinent documents, can be found in the Administrative Record file. The Administrative Record file is available at EPA's Superfund Records Center at EPA's Regional Office in San Francisco, and locally at two information repositories: the West Covina Library and the Rosemead Library. The addresses of these three repositories are:

U.S. EPA Superfund Records Center,
95 Hawthorne Street, Suite 403S
San Francisco, CA 94105-3901
Telephone: (415) 536-2000
Fax: (415) 764-4963

Rosemead Library
8800 Valley Boulevard
Rosemead, CA 91770
Telephone: (626) 573-5220

West Covina Library
1601 West Covina Parkway
West Covina, CA 91790
Telephone: (626) 962-3541

The Administrative Record for the WNOU was placed in CD-ROM format in each repository.

Throughout the development of the FS Addendum, EPA met frequently with a wide variety of local stakeholders to discuss ongoing activities and to solicit feedback. In addition, EPA held a public meeting to present the Proposed Plan and EPA's preferred alternative on November 19, 1998, at the South El Monte High School in South El Monte, California. At this meeting, EPA answered questions, and accepted oral comments about the WNOU and the preferred alternative.

Notice of EPA's public meetings, availability of the Proposed Plan, and the announcement of a 30-day public comment period was published in the San Gabriel Valley Daily Tribune on October 26, 1998.

EPA extended the public comment period in response to requests from members of the public. The total public comment period ran from October 26 to December 30, 1998. EPA received several sets of written comments during the public comment period. These comments are addressed in the Responsiveness Summary, included as Part III of this ROD Amendment.

4 Scope and Role of the Operable Unit

There are four areas of groundwater contamination in the San Gabriel Basin aquifer listed on the NPL as San Gabriel Valley Areas 1 through 4. Groundwater contamination in the San Gabriel Basin extends over very large areas (tens of square miles). The Basin includes a number of different areas of contamination with distinct conditions and contaminant sources. To facilitate implementation of remedial actions, EPA has divided the site into eight different OUs (Figure 1). All of the OUs were established to address groundwater contaminated with a variety of VOCs. Activities in the OUs continue to be conducted under EPA response authority.

- Alhambra OU- EPA is initiating a Remedial Investigation.
- Baldwin Park OU- EPA issued a ROD and an Explanation of Significant Differences and is negotiating with PRPs to implement the remedy.
- El Monte OU- EPA has issued a ROD and will be negotiating with PRPs to implement the remedy.
- Puente Valley OU- EPA issued a ROD and will be negotiating with PRPs to implement the remedy.
- Richwood OU- EPA issued a ROD and an alternative water supply was provided to local residents.
- South El Monte OU- PRPs and EPA have completed the RI/FS process. EPA has recommended a Preferred Remedy in a Proposed Plan.
- Suburban OU- EPA selected a no-action remedy in a ROD Amendment.
- Whittier Narrows OU- This OU is the subject of this ROD Amendment. EPA had previously issued a groundwater monitoring only ROD.

The WNOU specifically addresses groundwater contamination migrating from the San Gabriel Basin through the Whittier Narrows and into the Central Basin. At this time only the VOCs listed in Table 5 have been detected within the WNOU at levels that cause concern (see Section 7.1.1 for more information). However, other contaminants, such as perchlorate and N-Nitrosodimethylamine (NDMA) have been detected in the San Gabriel Valley upgradient of the WNOU. In the event that significant concentrations of these or other contaminants migrate into the WNOU, EPA expects to modify its response action in WNOU as necessary to protect groundwater in the Central Basin.

The WNOU remedial action described in the ROD Amendment is an interim action that is intended only to control the migration of contamination. In the future, additional remediation may be needed to clean up the remaining contamination. EPA will use information collected during operation of the selected remedies in the Whittier Narrows OU and upgradient South El Monte OU to help determine the need for additional actions. This interim action will neither be inconsistent with, nor preclude, implementation of the final remedy. It is anticipated that a final

ROD will be issued for the entire San Gabriel Valley Superfund site once remedial design/remedial action (RD/RA) implementation has been initiated at all of the OUs.

5 Site Characteristics

5.1 Location and Topography

The WNOU is located in the southern portion of the San Gabriel Valley (Figure 1), approximately 25 miles from the pacific coast, in eastern Los Angeles County. The San Gabriel Basin is a broad piedmont plain that slopes gradually to the southwest at a gradient of approximately 65 feet per mile (CDWR, 1966). Located within the San Gabriel Valley is the San Gabriel Basin, a natural ground-water reservoir that collects rainfall on the valley floor and run-off from the surrounding highlands.

The San Gabriel Basin is bounded to the north by the San Gabriel Mountains and to the southwest, south, and southeast by a crescent-shaped system of low hills. These hills, from west to east, are the Repetto, Merced, Puente, and San Jose Hills. The only significant break along this boundary falls between the Merced and Puente Hills at Whittier Narrows. Whittier Narrows is the lowest point in the San Gabriel Valley and is the exit for the San Gabriel River and Rio Hondo and their tributaries. These rivers serve as the drainage system for the valley.

Whittier Narrows is approximately 1-1/2 miles wide and extends from the Pomona Freeway (Highway 60) approximately 1-1/2 miles south to the Whittier Narrows Dam. South of Whittier Narrows lies the Montebello Forebay portion of the Central Basin.

5.2 Surface Water

Two major stream systems carry surface flow through the San Gabriel Valley: the San Gabriel River, the Rio Hondo, and their tributaries. The San Gabriel River and Rio Hondo transverse the San Gabriel Valley and exit through Whittier Narrows. In Whittier Narrows both the San Gabriel River and Rio Hondo channels are unlined and the two rivers act as sources of groundwater recharge. Except in the case of significant storms, the river channels do not carry much natural run-off. They do carry considerable non-natural flow from wastewater plant discharge and from imported surface water intended for groundwater recharge.

Two spreading grounds, the Rio Hondo and San Gabriel River Spreading Grounds, are located in the Montebello Forebay about two miles south of Whittier Narrows Dam. These spreading grounds, operated by the Los Angeles County Department of Public Works (LACDPW), serve as the two primary facilities for groundwater recharge in the Central Basin.

5.3 Hydrogeology

5.3.1 San Gabriel Basin

The San Gabriel Basin is filled with alluvial deposits that overlie relatively impermeable rock. These deposits are 2,000 to 4,000 feet thick over the center of the basin and range between approximately 250 to 800 feet thick at the basin outlet in Whittier Narrows.

Most of the San Gabriel Basin is characterized by interfingering lenses of alluvial deposits (e.g., cobbles, gravel, silt, and clay). The alluvial deposits show a high degree of variability in sediment type, both vertically and laterally. There are two distinct sources of sediment in the basin: the coarse-grained crystalline rocks of the San Gabriel Mountains and the finer-grained sedimentary rocks of the hills to the southeast and southwest. Sediment derived from the San Gabriel Mountains to the north is generally coarser-grained than that from the hills to the south. Consequently, hydraulic conductivity of the alluvium generally increases with proximity to the San Gabriel Mountains and proximity to the major rivers emanating from the m.

Under natural groundwater flow conditions, such as those encountered in the first half of this century, groundwater generally flowed away from the margins of the basin towards the center of the alluvial valley, and then towards Whittier Narrows (EPA, 1992a). In parts of the basin, concentrated groundwater withdrawal by pumping significantly affects the direction and rate of groundwater flow. Groundwater flow is also affected near areas of significant recharge, such as undeveloped alluvial fans, riverbeds and spreading basins. With the increased use of wells to extract groundwater from the basin, the pattern of groundwater flow in the basin has changed over time (EPA, 1992a). About 80 percent of the groundwater discharge from the San Gabriel Basin is now to production wells (EPA, 1992a). The remaining groundwater discharge consists of subsurface outflow through Whittier Narrows and minimal discharge to surface water in Whittier Narrows and Puente Valley. The estimated groundwater outflow from the San Gabriel Basin through Whittier Narrows and into the Central Basin, based on estimates from the San Gabriel River Watermaster, is about 29,000 acre-feet/year (EPA, 1992b).

5.3.2 Whittier Narrows OU

Whittier Narrows was formed by erosion, faulting, and subsequent filling with alluvium of a gap between the Merced Hills to the west and the Puente Hills to the east. Whittier Narrows and the Montebello Forebay are the transition zone between the discontinuous interfingering lenses of alluvial deposits of the San Gabriel Basin and the discrete and laterally continuous aquifers and aquitards of the Central Basin. Available well logs indicate that Whittier Narrows and the adjacent part of the Montebello Forebay have the same general characteristics of the San Gabriel Basin aquifer (i.e., discontinuous interfingering lenses of alluvial deposits). The discrete, continuous aquifers of the Central Basin begin to be more dominant further into Montebello Forebay.

In general, relatively coarse-grained materials (sands and gravel) occur from the surface to depths of 100 to 150 feet below ground surface. Below these, interfingering lenses of coarse- and fine-grained materials are observed in approximately equal proportions throughout the area. The depth to bedrock varies widely in Whittier Narrows both from west to east and north to south. In general, the depth to bedrock is more than 1,000 feet in areas north of Whittier Narrows Dam. In the vicinity of the dam there is considerable variability in the depth to

bedrock. It is generally less than 400 feet in the western portion of Whittier Narrows and more than 800 feet near the San Gabriel River towards the eastern side of the Narrows.

Unconsolidated deposits in the WNOU and the adjacent upgradient South El Monte OU consist of interbedded sediments comprised of gravel, sand, silt, and clay and mixtures of these materials. These sediments are of fluvial origin and comprise generally water-bearing deposits overlying Pico Formation bedrock in the area. The fluvial sediments generally consist of layers of relatively coarse materials comprised of medium sand to coarse gravel, alternating with layers of relatively fine materials comprised of fine to medium sand, with varying quantities of silt and clay. There are localized 10- to 90-foot-thick silt and clay layers. The depth-to-water in Whittier Narrows generally ranges from about 20 to 35 feet.

Below the shallow zone lies a somewhat continuous, series of relatively fine layers. This relatively fine layer sequence varies from about 30 to 160 feet thick in the northwest portion of the WNOU and southern portion of the South El Monte OU. Below the sequence of finer-grained layers, lie predominantly coarse sediments with limited, discontinuous, relatively fine layers. This second coarse-grained sequence is termed the intermediate zone.

The degree of hydraulic separation between the shallow zone and the intermediate zone is higher in the northwestern portion of the South El Monte OU, and decreases towards the south. Water level data do not indicate any significant hydraulic separation between the shallow and intermediate zones in central and southern Whittier Narrows. The number and thickness of clay and silt layers in the fine sequence between the intermediate and shallow zones is greater in South El Monte.

Hydraulic Conductivity

Hydraulic conductivity is a measure of how easily fluids can flow through porous media. EPA (1997b) recently conducted aquifer tests using production wells screened over large intervals (100 to 670 feet), located considerable distances from observation wells (500 to 2,400 feet), and pumping at high rates (2,400 to 4,900 gallons per minute (gpm)). The aquifer tests indicate that hydraulic conductivities in the upper 300 feet of the alluvial aquifer in western Whittier Narrows are greater than deeper portions by about an order of magnitude. The hydraulic conductivity estimates in the upper 300 feet of the alluvial aquifer range from about 200 feet/day to slightly less than 800 feet/day. This estimated hydraulic conductivity ranges between 25 and 100 feet/day.

Groundwater Flow Conditions

Groundwater flow directions in the shallow zone of the South El Monte and Whittier Narrows OUs are generally consistent with flow from the San Gabriel Basin to the Central Basin. While local flow directions may vary, shallow groundwater within the South El Monte OU generally flows towards Whittier Narrows, parallel to the San Gabriel River and the Rio Hondo. The hydraulic gradient ranges from 0.0009 to 0.003, averaging about 0.002 in most of the South El Monte and Whittier Narrows OUs. The hydraulic gradient is higher (meaning groundwater flow velocities are higher) in Whittier Narrows than in South El Monte as the groundwater moves through the narrow gap between the Montebello and Puente Hills. Calculation of groundwater velocity using the average gradient and hydraulic

conductivity values described for the shallow zone in Whittier Narrows results in an estimated rate of between 2 and 3 feet/day (approximately 750 to 1,000 feet/year).

Intermediate zone groundwater (generally between about 100 and 400 feet below ground surface) in the southern and eastern portions of the South El Monte OU and all of Whittier Narrows flows towards the Central Basin. Near the middle of the South El Monte OU there is a groundwater flow divide such that intermediate zone groundwater in northern and western portions of the South El Monte OU flows generally towards the west and not towards Whittier Narrows. Extensive groundwater extraction west of the South El Monte OU draws intermediate zone groundwater in that direction resulting in the flow divide.

In the Whittier Narrows vicinity, the best available sources of data for vertical flow directions are monitoring well clusters and multiport monitoring wells located in Whittier Narrows and South El Monte. At all locations, the data indicate downward vertical gradients from the shallow zone to intermediate zone. Groundwater level data also indicate that groundwater elevation differences between the shallow zone and intermediate zone are greater in the South El Monte OU than in the WNOU. This is because the relatively fine grain size materials and distinct layers constituting aquitards or confining layers are more prevalent in South El Monte than in Whittier Narrows. The steepest downward vertical gradients are in the northwestern portions of the South El Monte OU, where competent clay and silt layers are found and where significant groundwater production from intermediate and deeper zones occurs.

5.4 Groundwater Management

The Whittier Narrows area is located in the Main San Gabriel Basin while the Montebello Forebay, adjacent to and downgradient of Whittier Narrows is in the Central Basin. The rights to pump groundwater from both of these basins are adjudicated (i.e., assigned to specified users in accordance with a court judgment). There are three judgments that govern groundwater management in the Whittier Narrows vicinity.

5.4.1 San Gabriel Basin Judgment

Water rights in the Main San Gabriel Basin were adjudicated in a stipulated judgment by the Superior Court of Los Angeles County in 1973 (amended in 1989). This adjudication resulted in assigning water rights to approximately 50 parties that each hold rights to greater than one percent of the natural safe yield of the basin (152,700 acre-feet per year, established in the judgment), and approximately 100 parties that each hold rights to less than 1 percent of the natural safe yield. Also, according to the judgment, only selected parties have the right to export groundwater out of the Main San Gabriel Basin.

The judgment also establishes the duties of a Watermaster, which include annually determining an operating safe yield for the basin, monitoring pumpers' compliance with the judgment, issuing permits for all new and increased pumping in the basin, and preparing an annual report that includes details of pumping activities in the basin. The amount of groundwater that each water rights holder can pump in any year is adjusted by prorating the pumper's prescriptive

rights (percentage of natural safe yield) by the operating safe yield, as established by the Watermaster.

The majority of the groundwater pumped from the Main San Gabriel Basin is used for drinking water, supplied to the public by purveyors that are regulated as public water supply systems. Annually, pumping typically equals or exceeds the operating safe yield of the basin. When excess extraction occurs, the judgment has established provisions for assessing pumpers the cost of importing replacement water to replenish the excess amount that is extracted. Replacement water is imported water purchased by the Upper San Gabriel Valley Municipal Water District and artificially recharged within the basin. The 1997-98 replacement water assessment was $246.65 per acre-foot.

5.4.2 Long Beach Judgment

The Long Beach Judgment is the 1964 settlement of a lawsuit between parties in the Central and San Gabriel Basins. This judgment mandates that an average of 98,415 acre-feet of useable water will be delivered to the Central Basin each year from the San Gabriel Basin. This water consists of: (1) surface flow that passes through Whittier Narrows, (2) subsurface (groundwater) flow through Whittier Narrows, and (3) a portion of the water exported (piped) from the San Gabriel Basin to the Central Basin.

Although the Long Beach Judgment specifies an average entitlement of 98,415 acre-feet per year, the actual entitlement is calculated yearly by the court-appointed San Gabriel River Watermaster. The San Gabriel River Watermaster tabulates the water discharged through Whittier Narrows. If more than 98,415 acre-feet are delivered to the Central Basin from the San Gabriel Basin in a year, then the San Gabriel Basin is credited with the excess. Conversely, if less is delivered, the San Gabriel Basin is required to make up the difference either from past credits or, if that is not sufficient, through delivery of imported surface water as makeup water to the Central Basin.

5.4.3 Central Basin Judgment

Overdraft and long-term decline of groundwater levels in the Central Basin resulted in the formation of the Central Basin Water Association (CBWA) in 1950. The CBWA developed a plan to provide supplemental water to major producers, limit groundwater extraction from the Central Basin, and create an exchange water pool to provide groundwater-pumping rights for users lacking access to other supplemental water supplies.

Subsequent to the formation of the CBWA, a lawsuit ensued that resulted in the 1962 Central Basin Judgment. The Central Basin Judgment resulted in the adjudication of the Central Basin. Similar to the San Gabriel Basin Judgment, the Central Basin Judgment established the Central Basin Watermaster to administer the adjudication. The California Department of Water Resources serves as the Central Basin Watermaster. All producers of groundwater are assessed for replenishment water. Replenishment water is imported water purchased by the Water Replenishment District of Southern California (WRD) and artificially recharged within the basin. The 1997-98 replenishment water assessment by the WRD was $162 per acre-foot.

In 1991, the Central Basin Judgment was amended to provide a replenishment assessment exemption for contaminated groundwater extracted for the strict purpose of remediation. This

amendment does not include an upper limit to the quantity of water that may be exempt. However, any exemption is subject to WRD Board approval.

5.5 Groundwater Contamination

VOCs are the primary groundwater contaminants found above state and federal drinking water standards in the Whittier Narrows Operable Unit. The VOCs found in the WNOU are mobile in groundwater and are probable and/or potential carcinogens. The primary route of potential exposure for the public is through domestic use of untreated groundwater. The VOCs identified in the Baseline Risk Assessment (RA), including the 1997 RA Addendum and 1998 RA Supplement, as exceeding risk-based levels are:

- Chloroform
- 1,1-Dichloroethene (1,1-DCE)
- 1,2-Dichloroethane (1,2-DCA)
- 1,4-Dioxane
- Tetrachloroethene (PCE)
- Trichloroethene (TCE)

PCE and TCE have been detected most often in groundwater, although there are sporadic detections of other VOCs in excess of drinking water standards. Elevated VOC contamination primarily occurs in the western half of Whittier Narrows and PCE is detected at the highest concentrations. PCE concentrations as high as 300 µg/L are found in the shallow groundwater (up to 100 feet below ground surface).

PCE concentrations in the intermediate zone in Whittier Narrows are lower, generally less than 20 µg/L with a maximum of almost 80 µg/L. Exceedances of drinking water standards for both PCE and TCE have been detected up to 400 feet below ground surface in western Whittier Narrows. PCE concentrations just above drinking water standards have been detected in isolated locations in the Montebello Forebay, downgradient of Whittier Narrows. Figures 2 and 3 show the estimated extent of shallow and intermediate zone VOC contamination in the Whittier Narrows and South El Monte OUs as of the end of 1997.

As shown in Figures 2 and 3, groundwater contamination is flowing out of the San Gabriel Basin through Whittier Narrows and into the Montebello Forebay portion of the Central Basin. The Montebello Forebay area is the primary source of recharge for the Central Basin's drinking water aquifers. Groundwater contamination migrating from the San Gabriel Basin into this area could impact the water supply for millions of Central Basin water users. At this time, contaminant levels in the Central Basin generally remain below drinking water standards.

The shallow and intermediate chemical contamination found in western Whittier Narrows is migrating into the area from upgradient industrial contaminant sources. EPA has not found any significant sources of contamination within the western portion of the WNOU. Remediation of upgradient contaminant sources is occurring and will continue as part of activities in other San Gabriel Basin OUs. Within the WNOU, EPA has not identified any principal threat wastes.

6 Current and Potential Future Site and Resource Uses

6.1 Land Uses

Most of the WNOU is undeveloped land with virtually no residential usage. The land use is primarily dedicated to flood control, wildlife habitat, and recreational uses. Other land uses include agricultural and minor commercial and industrial operations. The western portion of the WNOU, where the groundwater contamination addressed in this ROD Amendment is located, is almost exclusively dedicated to flood control and used for recreational activities. Along the eastern edge of the OU, east of the San Gabriel River Freeway, lies an industrial area along the Union Pacific Railway. Given the important flood control use of the area, the current land uses in Whittier Narrows are not expected to change significantly over time. The land in western Whittier Narrows will likely remain primarily undeveloped.

The WNOU is surrounded by densely populated residential communities, commercial and heavy industrial areas, recreational, and undeveloped land. To the north of the WNOU (north of the Pomona Freeway) are the cities of South El Monte, South San Gabriel, and a portion of the Whittier Narrows Dam Recreational Area. The cities of South El Monte and South San Gabriel consist mainly of densely populated residential areas interspersed with light and heavy industrial and commercial areas. The Whittier Narrows Dam Recreation Area is only used for recreational purposes, which include golf, horseback riding, and camping. To the west of the WNOU are the Montebello Hills, which are currently the location of oil field operations. To the south of the OU border and Whittier Narrows Dam are the cities of Pico Rivera and Montebello, which consist mainly of heavily populated residential and light industrial areas. To the east is the undeveloped Puente Hills area, which includes Rose Hills Memorial Park (cemetery) and a portion of the Puente Hills Landfill.

Within Whittier Narrows other public works facilities include the Whittier Narrows Wastewater Reclamation Plant near the intersection of Rosemead and San Gabriel Boulevards and spreading grounds used for artificial recharge along the San Gabriel River and the Rio Hondo south of the Whittier Narrows Dam.

6.2 Groundwater Uses

The State of California has designated all portions of the San Gabriel Basin aquifer as either a current or potential source of drinking water. Groundwater in the Whittier Narrows and immediately downgradient in the Montebello Forebay is currently used extensively for drinking water. The City of Whittier operates a large wellfield in the middle of the Whittier Narrows, Suburban Water Systems operates a large wellfield in eastern Whittier Narrows. Although none of the wells in these wellfields currently exceed drinking water standards, there have been exceedances in the past. The City of Pico Rivera has a cluster of production wells just

south of Whittier Narrows Dam that temporarily exceeded drinking water standards, necessitating installation of a wellhead treatment system by the City.

The Los Angeles County Department of Parks and Recreation operates production wells within Whittier Narrows that are used to supply Legg Lake and for irrigation and drinking water use in the recreation areas.

None of the existing drinking water supply wells in Whittier Narrows OU are located in the portion of western Whittier Narrows where the highest concentrations of VOCs are currently found.

7 Summary of Site Risks

EPA's initial Screening Baseline Risk Assessment (RA) for the WNOU was presented in the 1992 Feasibility Study (EPA, 1992b). In 1997, EPA completed a Screening RA Addendum (EPA, 1997c) to update the 1992 RA with new groundwater quality data collected between 1991 and early 1997. An additional Supplemental RA was presented in the FS Addendum (EPA, 1998b) to incorporate all of the 1997 groundwater quality data.

The Baseline RA estimates the human health and environmental risks that the site could pose if no action were taken. It is one of the factors that EPA considers in deciding whether to take action at a site. In the WNOU, EPA's decision to take action is based primarily on the presence of contamination in groundwater at levels that exceed drinking water standards, evidence that contamination will continue to migrate into and out of the WNOU, and the use of groundwater as a source of drinking water. The RA is also used to identify the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD Amendment summarizes the results of the most recent 1998 Supplemental RA Addendum to the Screening Baseline Risk Assessment for the WNOU. The data evaluated in the 1998 Supplemental RA Addendum are the most relevant to the remedial action presented in this ROD Amendment.

Ecological concerns were evaluated in the initial Screening Baseline RA for the WNOU presented in the 1992 Feasibility Study (EPA, 1992b). This ecological evaluation found that groundwater contamination had little or no ecological impacts in the Whittier Narrows area.

7.1 Summary of Human Health Risk Assessment

This summary of human health risk includes sections on the identification of chemicals of concern (COCs), exposure assessment, toxicity assessment, and risk characterization.

7.1.1 Identification of Chemicals of Concern

In 1997, fifteen VOCs were detected in groundwater from monitoring wells in western Whittier Narrows. These fifteen VOCs were considered chemicals of potential concern (COPCs) for evaluation in the Supplemental RA Addendum. Of these fifteen, six exceeded the screening criteria and are considered chemicals of concern (COCs). Table 1 provides information on these COCs in each of three well groups representing three contaminated portions of the aquifer in western Whittier Narrows: shallow zone- most contaminated, shallow zone, and intermediate zone.

As shown in Table 1, six COCs were found in groundwater in the western portion of the WNOU. All of the COCs are VOCs and all six are present in the most contaminated portion of the shallow zone. The table also shows the frequency of detection (i.e., the number of times the chemical was detected in the samples collected from each groundwater zone during 1997 groundwater sampling). The table indicates that PCE and TCE are the most frequently detected

COCs in the WNOU. Figures 2 and 3 represent the extent of VOC contamination in groundwater at the site.

Table 1 presents the exposure point concentration for each of the COCs detected in each of the three groundwater zones evaluated. In all three zones, the highest exposure point concentrations were from PCE. The 95th percentile (95%) upper confidence limit (UCL) on the arithmetic mean concentration was used as the exposure point concentration for most of the COCs in the three groundwater zones. However, in several instances the maximum concentration detected was used as the default exposure point concentration because it was lower than the 95% UCL. This was generally the case where there were a limited number of detections for the COC in the individual groundwater zone.

7.1.2 Exposure Assessment

Exposure refers to the potential contact of an individual (or receptor) with a chemical. Exposure assessment is the determination or estimation of the magnitude, frequency, duration, and route of potential exposure. This section briefly summarizes the potentially exposed populations, the exposure pathways evaluated, and the exposure quantification from the RA performed for the WNOU.

Land use in western Whittier Narrows primarily consists of flood control and recreational uses. However, there are several groundwater production wells in western Whittier Narrows that are used for domestic, recreation, and irrigation purposes. Exposure to contaminants could occur from the use of groundwater for:

- Domestic purposes, such as ingestion of tap water and inhalation of contaminants from water used for bathing, cooking and laundering.
- Recreational use of water for activities such as swimming and wading.
- Contact with irrigation water, and inhalation of water sprayed from sprinklers.

It should be noted that the assumption that residents could be exposed to groundwater from one of the three groundwater zones is conservative. There are not currently any wells producing water for public drinking water supply from the any of the three contaminated portions of the aquifer. Further, regulations, such as the Safe Drinking Water Act, currently prohibit water purveyors from serving water contaminated in excess of MCLs to consumers.

Based on potential for exposure frequency, duration, and estimated intake, residents exposed to contaminated groundwater used for domestic purposes are expected to be the maximally exposed population. In the WNOU RA, EPA evaluated scenarios in which either a current or future resident might be exposed to contaminated groundwater through domestic use.

7.1.3 Toxicity Assessment

Table 1 shows the six identified COCs for the WNOU. For the Supplemental Screening RA, a toxicity assessment was performed to evaluate both non-carcinogenic and carcinogenic effects for these COCs. The toxicity of the COCs was evaluated using health-based and regulatory criteria. A criteria comparison table was developed, including EPA Region 9 Preliminary Remediation Goals (PRGs) (EPA, 1998c), maximum contaminant levels (MCLs) (EPA, 1996a)

and State Action Levels (California, 1999a). These criteria are summarized in Table 2. These criteria were selected for the following reasons:

- PRGs use a health-protective target cancer risk of 10^{-6} and a target non-cancer hazard quotient of 1, assuming ingestion of tap water and inhalation of VOCs from showering, laundering, and dishwashing in a residential setting. These criteria are appropriate as a first tier screening criteria for groundwater that is potentially used as a source of drinking water. PRGs represent health-conservative concentrations of chemicals in groundwater that are presumed to be without appreciable risk of deleterious effects. Chemical concentrations below the PRG should not result in significant effects.

- MCLs are enforceable standards for the maximum permissible level of a contaminant in water that is delivered to any user of a public water system. MCLs are set as close to health-based goals (i.e., maximum contaminant level goals), as feasibly possible. Therefore, exceedance of an MCL is generally considered to constitute a concern for public health. MCLs are regulatory criteria that are appropriate for a first tier screening of groundwater that is used as a source of drinking water.

To evaluate potential exceedances of EPA's risk management range (one in a million [10^{-6}] to one in ten-thousand [10^{-4}]), target cancer-risk levels of 10^{-6}, 10^{-5}, 10^{-4} and a non-cancer hazard quotient of 1 were used to develop risk-based concentrations based on the methodology EPA uses to develop Region 9 PRGs. These risk-based concentrations, presented in Table 2, can be used to define the 10^{-6} to 10^{-4} risk range for individual chemicals but do not address cumulative risks for multiple chemicals.

7.1.4 Risk Characterization

This section presents the results of the evaluation of the potential risks to human health associated with exposure to contaminated groundwater from the WNOU. Exposure scenarios are evaluated by estimating the non-carcinogenic and carcinogenic risks associated with them.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer an individual faces from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6}. An excess lifetime cancer risk of one in ten thousand (1×10^{-4}) is the point at which action is generally required at a site (EPA, 1991).

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., a life-time) with a reference dose (RfD) derived for a similar exposure period. A RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient. A hazard quotient less than one indicates that a receptor's dose of a single contaminant is less than the RfD and that toxic non-carcinogenic effects from exposure to that chemical are unlikely. Hazard quotients for all COCs that affect the same target organ (e.g., liver) are added together to generate the Hazard Index (HI). A HI less than one indicates that

non-carcinogenic effects from all the contaminants are unlikely. Conversely, a HI greater than one indicates that site-related exposures may present a risk to human health.

7.1.5 Conclusions

Risks associated with VOCs detected in three well groups representing areas of contaminated groundwater within the western portion of the WNOU were evaluated. Human receptors potentially exposed in the future to VOCs present in groundwater include individuals using groundwater for domestic, industrial, or recreational purposes. The use of residential criteria in this screening evaluation is expected to be protective of these potential current and future uses of groundwater. As noted above, no wells are currently producing groundwater from within the three contaminated areas for use as drinking water supply.

Carcinogenic and non-carcinogenic risks were evaluated by screening the monitoring well data against EPA Region IX PRGs and risk-based concentrations. The data were also compared to drinking water MCLs. The non-carcinogenic PRGs were not exceeded by exposure point concentrations for any of the groundwater areas (this means that none of the hazard quotients exceeded one).

Table 3 summarizes the exceedances of MCLs, carcinogenic PRGs and risk-based concentrations for each groundwater area. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of exposure to contaminated groundwater, as well as the toxicity of the COCs. The total potential carcinogenic risk estimated for each area by adding all of the COCs shown in Table 3 together is 1.6×10^{-4} in the most contaminated portion of the shallow zone, 3.2×10^{-5} in the rest of the shallow zone, and 6.0×10^{-5} in the intermediate zone. The COC contributing to most of this risk in all three areas is PCE.

Based on this risk characterization summary, actual or threatened releases of hazardous substances at this site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

7.2 Summary of Ecological Concerns

A brief evaluation of ecological concerns was included in the initial Screening Baseline RA for the WNOU presented in the 1992 Feasibility Study (EPA, 1992b). This ecological evaluation is summarized below. There has been no update to the initial evaluation and a formal ecological Risk Assessment has not been completed.

The focus of the WNOU is regional groundwater contamination. As such, the potential for ecological receptors to be exposed is associated with the extent that groundwater contaminants migrate or are discharged into surface water habitat. Ecological receptors could be exposed to groundwater contaminants in the WNOU through discharge of contaminated groundwater (either natural groundwater discharge or manmade discharge) into surface water bodies that contain ecological receptors.

The depth to water in western Whittier Narrows is approximately 15 to 20 feet. Given these conditions, across most of western Whittier Narrows, groundwater could not discharge to

surface water and exposure through this pathway is not possible. However, EPA's Interim San Gabriel Basin RI Report (EPA, 1992a) indicates that, during times of high groundwater levels, limited natural discharge of groundwater to surface water (caused by shallow groundwater levels intersecting stream channel bottoms) does occur in the Rio Hondo south of the Pomona Freeway.

There are a number of production wells in Whittier Narrows that are being used by the Los Angeles County Department of Parks and Recreation and the Rose Hills Memorial Park Association for irrigation and to fill lakes and ponds.

The Los Angeles County Department of Park and Recreation uses extracted groundwater in the Whittier Narrows Recreation Area and the Whittier Narrows Nature Center. In the Recreation Area, the three lakes (collectively called Legg Lakes) are between 20 and 35 acres in size and are interconnected by spillways. There is extensive recreational use, including swimming, at and around the lakes. Waterfowl and shorebirds use the lakes and they contain various fish species. The lakes may also provide habitat for several amphibian and reptile species.

The lakes at the Whittier Narrows Nature Center are much smaller than the three Legg Lakes and contain freshwater marsh habitat. The Nature Center provides habitat for native fauna and wildlife and is protected from recreational use and disturbance. At Rose Hills Memorial Park, there is a single pond inhabited by ducks, geese and koi fish. Various bird species also use the pond area and islands.

There are a fairly large number of special status species (i.e., those species that are listed, proposed for listing, or candidates for listing as threatened or endangered species) found in the Whittier Narrows area (see Table 4). Some of these species could potentially be exposed to groundwater that is used to fill the lakes and ponds or that discharges into the Rio Hondo. In addition, numerous other environmental receptors, including vegetation and wildlife in the area could potentially be exposed to the discharged groundwater.

The VOCs detected in groundwater in Whittier Narrows (primarily PCE and TCE) are not expected to significantly bio-concentrate in aquatic organisms or adsorb to sediment (Howard, 1989 and 1990). The primary removal mechanism for these VOCs from surface water will be volatilization to the atmosphere. The half-life of the primary VOCs in surface water ranges from less than 1 day to several weeks for PCE and minutes to hours for TCE (Howard, 1989 and 1990).

EPA, under the Clean Water Act, publishes national ambient water quality criteria (AWQC). These criteria should protect most aquatic life and its uses. The freshwater AWQC for acute effects is 5,280 µg/l for PCE and 45,000 µg/L for TCE. The freshwater AWQC for chronic effects is 840 µg/L for PCE. There is no chronic AWQC for TCE. The acute and chronic chemical-specific AWQC are considerably higher than the contaminant concentrations detected in Whittier Narrows groundwater (described above in Section 7.1). Accordingly, no adverse impact to aquatic organisms or other organisms that consume them is expected.

8 Remediation Objective

EPA's Remedial Action Objective (RAO) for the WNOU is:

> **To the extent technically and economically feasible, EPA intends to control contaminant migration in Whittier Narrows so that contamination originating from industrial activities in the San Gabriel Basin will not cause production wells in Whittier Narrows and the Central Basin to exceed drinking water standards.**

EPA modified the RAO presented in the Feasibility Study and Proposed Plan to better express its goal of protecting public water supplies from all industrial contaminants that may move through Whittier Narrows. The original RAO referred specifically to the control of VOCs. However, other contaminants found in groundwater upgradient from Whittier Narrows may pose a threat to production wells in the WNOU and Central Basin in the future.

The Central Basin is a separate and distinct groundwater resource from the San Gabriel Basin and the Montebello Forebay portion of the Central Basin is of critical importance to all Central Basin aquifers. This area is the primary source of recharge for the entire Central Basin. Subsurface flow of groundwater out of Whittier Narrows provides a significant portion of this recharge. Surface flow in the San Gabriel River and Rio Hondo infiltrates into the aquifers as it travels along the river beds and as it pools in the recharge facilities located along the Rio Hondo and San Gabriel River. All of the primary drinking water aquifers of the Central Basin are found at relatively shallow depths in the Montebello Forebay, and there is a general lack of fine-grained sediments to act as aquitards and limit downward migration of groundwater (and any contaminants present in the water).

Because groundwater contaminated with PCE at levels significantly above its MCL already extends to the area near Whittier Narrows Dam, any remedy selected will need to include groundwater extraction near the Dam to meet the RAO. This is the only action that can effectively inhibit further migration of contaminated groundwater in Whittier Narrows.

The RAO reflects EPA's regulatory goal of restoring usable groundwater to its beneficial uses wherever practicable, within a time frame that is reasonable; or, if restoration is deemed impracticable, to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction (40 CFR Section 300.430(a)(1)(iii)(F)). The RAO addresses the risks associated with exposure to contaminated groundwater in Whittier Narrows (described in Section 7) by significantly limiting the potential for future exposure.

To meet the RAO, migration control will be required in the WNOU as long as groundwater concentrations moving through the Whittier Narrows exceed state or federal drinking water standards. The RAO does not include numeric, chemical-specific objectives in the aquifer or a specific time frame for restoration of the aquifer because this is an interim action to contain contamination and the Whittier Narrows remedial action does not address the sources of contamination, which are located in upgradient areas. Remediation in upgradient OUs will determine the length of time that an action in Whittier Narrows will need to operate.

As discussed previously, implementation of aggressive remedial actions in the upgradient South El Monte OU could potentially reduce the time frame required for overall remediation or reduce the magnitude of extraction required in Whittier Narrows in the future, resulting in reduced long-term costs. The impacts of the selected remedy for the South El Monte OU on the selected remedy for the WNOU will be considered during remedial design.

9 Description of Alternatives

EPA evaluated two alternatives in the FS Addendum for the WNOU:

- Alternative 1- No-Additional-Action
- Alternative 2- Groundwater Containment near Whittier Narrows Dam

EPA typically evaluates several alternatives other than the No-Action-Alternative. In this case, only one active alternative was identified that would meet the RAO. This alternative is to extract and treat groundwater that exceeds drinking water standards and to conduct this extraction near Whittier Narrows Dam. Groundwater containment options other than extraction were not considered because the existence of significant contamination to depths of 400 feet precludes other technologies.

EPA considers the area near the dam to be the only suitable location for extraction because much of the groundwater north of Whittier Narrows Dam is contaminated and the groundwater south of the dam has remained relatively clean. If EPA located groundwater extraction too far north of the dam, contamination present south of the site of the extraction wells would eventually move into the Central Basin. On the other hand, locating the extraction too far south of the dam, beyond the current extent of contamination, would allow the contamination to spread over a much larger area, including portions of the Central Basin. By locating the extraction near the dam, EPA can best control contaminant migration, reduce risks from potential exposure to the contaminated groundwater, and protect the area's groundwater resource.

A brief description of the two remedial alternatives is presented below.

9.1 Alternative 1 – No Additional Action

The NCP requires a no-action alternative to provide a baseline for comparison to other alternatives. Under this alternative, the current March 31, 1993, ROD for the WNOU would remain unchanged. No additional remedial actions would be taken to control the migration of contaminants in the WNOU. This alternative is titled "no-additional-action", rather than "no action", because it would include ongoing groundwater monitoring in accordance with the 1993 ROD, but would not include groundwater containment or treatment.

The only costs associated with this alternative are for long-term groundwater monitoring. While it is unclear how long groundwater monitoring must continue, for cost estimating purposes, EPA assumed monitoring would be needed for the next 30 years.

9.2 Alternative 2 - Groundwater Containment Near Whittier Narrows Dam

Alternative 2 involves installation of a groundwater extraction and treatment system to inhibit migration of contaminated groundwater through Whittier Narrows. The system would be designed to contain groundwater with chemical contaminant concentrations above primary drinking water standards (i.e., MCLs). This alternative consists of five key components:

- A groundwater extraction system located near the downgradient limit of contaminant concentrations exceeding MCLs
- Centralized treatment to reduce contaminant concentrations to acceptable levels.
- Conveyance systems, such as pipelines, booster pumps, to transport contaminated groundwater from the wells to the treatment plant, and treated water from the plant to the designated end use
- Use of the treated water by a local water purveyor or recharge of the water back to the aquifer using existing Montebello Forebay spreading grounds or other recharge facilities
- Groundwater monitoring to help optimize system design; measure the performance of the containment system and provide early warning of upgradient conditions that could affect the system

For cost estimating purposes, two representative scenarios of Alternative 2 were evaluated:

Scenario A:

- Groundwater extraction north of the Whittier Narrows Dam
- Centralized treatment north of the Dam using air stripping with VGAC off-gas treatment and additional LGAC treatment to reduce contamination to non-detectable levels.
- Discharge of the treated water to the City of Whittier and Suburban Water Systems at their transmission mains in Whittier Narrows. (It is possible that other water systems would take the water. Connections to the City of Whittier and Suburban Water Systems facilities were assumed for cost estimating purposes only).

Scenario B:

- Groundwater extraction south of the Whittier Narrows Dam
- Centralized treatment south of the Dam using air stripping with VGAC off-gas treatment to reduce contamination to MCLs.
- Discharge of the treated water to spreading grounds along the Rio Hondo for aquifer recharge.

These two scenarios are considered representative of actual components of a remedy that may be implemented and provide a reasonable range of potential remedial costs. Use of these two scenarios is for cost-estimating purposes only and is not intended to limit EPA's flexibility to

implement other extraction locations, treatment technologies, or end-use recipients that more cost-effectively meet the remedial action objectives.

9.2.1 Extraction

Groundwater extraction in Alternative 2 assumes that eventually a total of three extraction well clusters will be needed and that each extraction well cluster would be equipped with a shallow and an intermediate extraction well. In Scenario A, the wells would be located on USACE property north of the Whittier Narrows Dam. Each well and its controls would need to be constructed to withstand periodic inundation by flood storage behind the Dam. In Scenario B, the wells would be located on USACE property (currently leased by others) immediately south of the Dam. The maximum total extraction rate assumed is approximately 9,000 gpm, with an assumed average rate of 7,500 gpm. The actual extraction well locations and rates will be determined during remedial design based on additional evaluation during remedial design investigations.

EPA anticipates that implementation of the extraction component of the remedy would be phased to optimize system flexibility and increase cost-effectiveness. The overall width of the target area needing to be contained is expected to vary over time. Initially, EPA expects the extraction rates needed for containment to be below the average rate assumed above (7,500 gpm). The size of the area requiring containment will likely increase over time, then eventually decrease. To account for these potential changes, EPA plans to phase in operation of the extraction wells, only pumping what is need for containment at that time. As remedy operations progress, remedy refinements will be performed to ensure that extraction focuses only on those areas exceeding ARARs.

9.2.2 Treatment

Assumed treatment facilities for Alternative 2, Scenarios A and B, are presented below.

Scenario A Treatment Facility

Under Scenario A, EPA would enter into an agreement with a water purveyor where EPA would exercise the water purveyor's pumping rights in exchange for providing the purveyor with the extracted water. EPA would treat the water to remove the contamination to levels suitable for drinking water purposes so that the water purveyors could sell the water to its customers (primarily residential). EPA expects to receive reimbursement from the water purveyor for a portion of the pumping and treatment costs.

Water served by local water purveyors must meet requirements imposed by the California Department of Health Services. Their requirements may include the reduction of contaminant concentrations to non-detectable levels. Therefore, this scenario assumes that the remedy would include treatment to non-detectable levels.

The most cost-effective process to treat current VOC contamination to non-detectable levels appears to be air stripping with VGAC off-gas treatment and additional LGAC treatment. The treatment plant would have four air stripping towers, each 35 to 40 feet high. The LGAC vessels used for polishing would be approximately 15 feet high. In this scenario, it has been assumed that the centralized treatment plant would be located north of Whittier Narrows Dam. It is also

assumed that the treatment plant would be constructed on an elevated pad to provide protection for the 100-year flood.

EPA may discharge some or all of the groundwater extracted north of the Whittier Narrows Dam to the Rio Hondo, San Gabriel River or other recharge facilities if supplying treated water to a purveyor becomes technically or financially undesirable and if recharge capacity exists north of the Dam.

Scenario B Treatment Facility

Under Scenario B, EPA would discharge treated water to spreading grounds in the Central Basin. This scenario assumes that extracted groundwater would be treated to MCLs. It appears that the most cost-effective treatment process to treat current VOC contamination to MCLs is air stripping with VGAC off-gas treatment. The Scenario B treatment facility would be essentially the same as that described above for Scenario A, except that it would not include LGAC treatment. The assumed treatment plant would have four air stripping towers, each 35 to 40 feet high. The centralized Scenario B treatment plant would be located immediately south of Whittier Narrows Dam.

9.2.3 Conveyance

Assumed conveyance systems for Alternative 2, Scenarios A and B are presented below.

Scenario A Conveyance Systems

During remedial design, EPA will consider conveyance of treated groundwater to any purveyor that is capable of accepting the water in a cost-effective manner. The following conveyance systems have been assumed in Scenario A for costing purposes:

- Pipelines from the extraction wells to the treatment plant (assume 16- to 27-inch diameter, 5,150 feet total length)
- Pipelines from the treatment plant to the City of Whittier and Suburban Water Systems transmission lines (assume 27-inch diameter, 6,400 feet total length)
- A booster pump station, located at the treatment plant, to meet the pressure requirements of an LGAC treatment system and the respective purveyor transmission lines.

The conveyance system would be designed to provide all or part of the treated water to either purveyor. This provides operational flexibility to help meet extraction requirements on a year-round basis. The pipeline from the treatment plant would be split just prior to connecting with the City of Whittier transmission line. The pipeline connecting to the Suburban Water Systems transmission line would have to be constructed under the San Gabriel River.

During Remedial Design, EPA may determine that some or all of the groundwater extracted and treated north of the Whittier Narrows Dam should be discharged to recharge areas such as the Rio Hondo, San Gabriel River, or other areas. In this case, appropriate conveyance facilities would be installed from the treatment plant to the discharge point(s).

Scenario B Conveyance Systems

The following conveyance systems have been assumed for Scenario B:

- Pipelines from the extraction wells to the treatment plant (assume 16- to 27-inch diameter, 2,750 feet total length)
- Pipelines from the treatment plant to the concrete-lined Rio Hondo (assume 27-inch diameter, 5,260 feet total length)
- Drop structure and energy dissipater to prevent treated water discharged to the Rio Hondo from damaging the channel

No other conveyance systems have been included under Scenario B. However, it may be determined during remedial design that a pipeline from the treatment plant to the San Gabriel River, or to a storm drain that discharges to the San Gabriel River, may be warranted as a supplemental option for improving operational flexibility.

9.2.4 Discharge

In Scenario A, it is assumed that treated water would be discharged to City of Whittier and Suburban Water Systems water transmission lines. These large-diameter pipelines transmit water from wells in Whittier Narrows to municipal distribution facilities to the south. Because the treated water would meet state and federal drinking water standards, this scenario represents the highest beneficial use of the water.

The City of Whittier and Suburban Water Systems have similar water demands. Either of these purveyors could accept the entire treatment plant discharge in the high-demand summer months. However, during portions of the winter, both purveyors together may not have sufficient demand to accept the entire 9,000 gpm. For costing purposes, it is assumed that the treatment plant discharge is split evenly between the two recipients on a continuous basis. It should be noted that, as described previously, there are several agreements that would need to be negotiated before EPA could distribute treated water to local purveyors. EPA's ability to enter into the necessary agreements would affect which purveyors could receive treated water, the flow rates that they accept and the costs of the remedy.

Alternatively, if necessary agreements with water purveyors cannot be reached, some or all of the treated water could be discharged into recharge facilities north of Whittier Narrows Dam. However, these facilities are limited and do not have sufficient capacity to handle the volumes expected from the remedy. Water that cannot be recharged within the San Gabriel Basin would flow past Whittier Narrows Dam and may have to be replenished at a relatively high cost.

In Scenario B, the treated water would be discharged to the Rio Hondo, diverted from the river into the Rio Hondo Coastal Spreading Grounds approximately 1.4 miles downstream, and recharged into the Central Basin aquifers. Under this scenario, nearly all of the extracted groundwater would be returned to the aquifer. However, there would be minor losses to evaporation. During the few days a year when there is heavy rainfall and no available capacity in the spreading grounds (15 days per year on average), the extraction of groundwater may need to be temporarily reduced or shut down. The shut down would be intended to minimize loss of treated water to the ocean and any associated Replenishment Water Assessment costs. Given the value of the resource, EPA will limit the amount of water discharging to the ocean as much as possible.

9.2.5 Operations and Maintenance

Operations and maintenance (O&M) is included in Alternative 2 to ensure that containment goals are met through continued efficient operation of the various systems installed as part of the remedial action. Operators will make sure that the appropriate performance requirements are being met, including appropriate extraction rates and treatment plant discharge concentrations. O&M also covers routine preventative maintenance and performing necessary repairs to system components.

Examples of specific activities necessary to maintain system performance and ensure that containment goals are met include: periodic extraction well rehabilitation, pump and motor lubrication and maintenance, replacement of spent carbon, acid backwash of air strippers, replacement of strainers and filters, backwash of LGAC vessels (if installed), and other maintenance.

9.2.6 Monitoring

Groundwater monitoring under Alternative 2 has two main purposes: (1) monitor the effectiveness of the containment barrier and provide information to optimize its operation; and (2) provide early warning of upgradient conditions that could impact the containment system. Upgradient conditions that could impact system operations include increases or decreases in the lateral or vertical extent of contamination, increases or decreases in contaminant concentrations, or detection of new contaminants that could necessitate extraction rate or treatment plant modifications.

The existing groundwater monitoring program in Whittier Narrows is expected to meet most of the monitoring needs for either Alternative 2 scenario. The existing monitoring program would be augmented with piezometers in the vicinity of the extraction wells for the purpose of measuring hydraulic head. Under Scenario B, two additional multiport monitoring wells are assumed to measure water quality downgradient of the extraction wells.

Wells or zones would be sampled at a frequency determined by the history of contamination in the area of the well, proximity to important features (such as production wells), or other factors. Data gathered under the monitoring program will be used to adjust extraction rates to maintain contaminant containment.

10 Comparative Analysis of Alternatives

The two remedial alternatives described in Section 9 are compared to the nine Superfund evaluation criteria listed in 40 CFR Section 300.430. The comparative analysis provides the basis for determining which alternative presents the best balance of the criteria. The first two evaluation criteria are considered *threshold criteria* that the selected remedial action must meet. The five *primary balancing criteria* are considered to achieve the best overall solution. The two *modifying criteria*, state and community acceptance, are also considered in remedy selection.

Threshold Criteria

- **Overall Protection of Human Health and the Environment** addresses whether each alternative provides adequate protection of human health and the environment, and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, and/or institutional controls.
- **Compliance with ARARs** addresses the requirement of Section 121(d) of CERCLA that remedial actions at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations, which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Primary Balancing Criteria

- **Long-term Effectiveness and Permanence** refers to the ability of a remedy to maintain reliable protection of human health and the environment over time.
- **Reduction of Toxicity, Mobility, or Volume Through Treatment** refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.
- **Short-term Effectiveness** addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers and the community during construction and operation of the remedy until cleanup goals are achieved.
- **Implementability** addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.
- **Cost** evaluates the estimated capital, operation and maintenance (O&M), and indirect costs of each alternative in comparison to other equally protective alternatives.

Modifying Criteria

- **State Acceptance** indicates whether the state agrees with, opposes, or has concerns about the preferred alternative.
- **Community Acceptance** includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose.

This section describes each threshold and primary balancing criterion, evaluates each alternative in relation to each criterion, and identifies advantages and disadvantages among the alternatives in relation to each criterion.

10.1 Overall Protection of Human Health and the Environment

This evaluation criterion is a threshold requirement. Alternatives are assessed to determine whether they can adequately protect human health and the environment, in both the short and long term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site.

Alternative 1, the No-Additional-Action Alternative, would not provide adequate protection of human health and the environment. It does not provide any additional migration control beyond the limited capture generated by existing water production wells, which do not prevent contaminated groundwater leaving the San Gabriel Basin in western Whittier Narrows. Alternative 1 would:

- Allow the potential for human exposure to increase;
- Leave existing wells vulnerable to contaminant migration.
- Increase the cost and difficulty of operating existing and future treatment facilities when more highly contaminated groundwater reaches production wells; and
- Result in unacceptable degradation of the Central Basin groundwater resource.

The No-Additional-Action Alternative does include groundwater monitoring in Whittier Narrows under the existing ROD that would continue to provide early warning of expected increases in contaminant concentrations.

Alternative 2 would provide overall protection of human health and the environment by:

- Reducing short- and long-term risks through containment of contaminated groundwater within the San Gabriel Basin;
- Reducing the impact of continued contaminant migration on water supply wells in the Whittier Narrows area and the Central Basin; and by
- Protecting future uses of less contaminated and uncontaminated portions of the aquifers in both Whittier Narrows and the Central Basin.

The Alternative 2 "A" Scenario provides better overall protection of human health and the environment than the Alternative 2 "B" Scenario because the location of extraction would better protect the City of Whittier wellfield from the impacts of continued contaminant migration.

Alternative 2 would also reduce the toxicity, mobility, and volume of the contaminants and remove contaminant mass from the aquifer. The treatment technologies that are assumed for Alternative 2 are known to be effective in meeting federal and state drinking water standards.

10.2 Compliance with ARARs

Compliance with ARARs is a threshold criterion. Section 121(d) of CERCLA requires that remedial actions at CERCLA sites attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations that are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that specifically address hazardous substances, the remedial action to be implemented at the site, the location of the site, or other circumstances present at the site.

Relevant and appropriate requirements are those substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that, while not applicable to the hazardous materials found at the site, the remedial action itself, the site location or other circumstances at the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to the site.

Alternative 1 (No-Additional-Action) would not meet ARARs. It would allow continued uncontrolled migration of contaminants, at levels exceeding MCLs, into the Central Basin and towards production wells in the Montebello Forebay. Alternative 1 would not ensure that water produced from these production wells will meet drinking water ARARs and would not protect uncontaminated groundwater in the Central Basin.

Alternative 2 is configured to meet ARARs. This includes ARARs related to protection of the drinking water supply, treatment of extracted groundwater, and discharge of the treated water (either to water purveyors or to the San Gabriel River and/or Rio Hondo). This alternative would be designed to contain contamination, and to protect the existing production wells and significant portions of the aquifer that are currently less contaminated or uncontaminated.

10.3 Long-Term Effectiveness and Permanence

This evaluation criterion assesses the extent to which each remedial alternative reduces risk after the remedial action objectives are met. The magnitude of the residual risk depends on the magnitude of the remaining wastes and the adequacy and reliability of controls, if any, that are used to manage untreated waste and treatment residuals. For this action, untreated waste refers to any contaminated groundwater not removed from the aquifer. Treatment residuals would include spent carbon.

The performance of the alternatives in relation to this criterion is evaluated by assessing the extent to which they affect the migration of contaminants. The No-Additional-Action Alternative would not limit the migration of contaminated groundwater into the Central Basin. Alternative 2, however, will be designed to contain groundwater with contaminant concentrations that exceed MCLs.

Alternative 2 would allow groundwater with contaminant concentrations less than MCLs to continue to migrate into the upgradient portion of the Central Basin (i.e., the Montebello Forebay). Because this groundwater would meet drinking water standards Alternative 2 would protect the existing and potential beneficial uses of Central Basin groundwater.

Without remedial actions in the adjacent South El Monte OU, groundwater in Whittier Narrows upgradient of the Alternative 2 containment barrier would likely remain contaminated for the foreseeable future. Groundwater containment actions in South El Monte could reduce contaminant levels in Whittier Narrows and potentially shorten the operating life of the remedy in Whittier Narrows.

Alternative 2 does not attempt to address contamination that has already migrated or will migrate beyond the capture zone of the containment barrier before it becomes operational.

10.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion addresses the preference, as stated in the NCP, for selecting remedial actions and employing treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as a principal element of the action. This preference is satisfied when treatment is used to reduce the principal threats at a site through destruction of toxic contaminants, reduction of total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

Alternative 1 would not provide any reduction in toxicity, mobility, or volume, and does not satisfy the statutory preference for treatment. Alternative 2 would satisfy the statutory preference for treatment. Alternative 2 would employ processes that significantly reduce the volume of contaminants in groundwater by capturing and removing contamination. Producing an effluent stream that meets drinking water standards reduces the toxicity and volume of hazardous contaminants. Air stripping with off-gas carbon controls also reduces mobility by transferring contaminants from groundwater to the carbon adsorbers. The treatment process can be considered destructive and irreversible if the carbon reactivation process is considered part of the technology. Alternative 2 would generate treatment residuals in the form of spent carbon.

10.5 Short-Term Effectiveness

This criterion evaluates the effects of each remedial alternative on human health and the environment during the construction and implementation phases until remedial action objectives are met. The following factors are addressed for each alternative:

Protection of workers and the community during construction and implementation phases. This factor qualitatively examines risk that results from implementation of the proposed remedial action and the effectiveness and reliability of protective measures.

> The No-Additional-Action alternative is not evaluated for this criterion because there is no construction or implementation phase. Alternative 2 would not pose unmitigable risks to the community during construction and implementation; nor would it pose unmitigable risks to workers beyond general construction hazards associated with large construction projects.

Environmental impacts. This factor addresses the potentially adverse environmental impacts that may result from the construction and implementation of an alternative. This factor also

evaluates the reliability of the available mitigation measures to prevent or reduce potential impacts.

Potential environmental impacts during and after construction of the extraction wells, treatment plant, and pipelines were evaluated for the following factors:

- Biological resources
- Cultural resources
- Land use
- Water resources/quality
- Air quality
- Noise
- Aesthetics
- Traffic

No unmitigable negative environmental impacts are expected to result from implementing Alternative 2; and its implementation will improve groundwater quality and help provide a safe and reliable drinking water supply for local water purveyors. Mitigation of identified environmental impacts would be evaluated in detail during remedial design.

- **Time until remedial action objectives are achieved.** This factor estimates the time for the remediation system to be constructed and meet objectives.

  For the No-Additional-Action Alternative, the remedial action objectives will not be met as long as contaminant migration continues. Contaminant migration is likely to continue for a considerable length of time. The remedial action objectives are met for Alternative 2 as soon as the groundwater extraction and treatment components begin operation and establish hydraulic control.

  The time until objectives are achieved (i.e., system startup) for Alternative 2 is anticipated to be within approximately 2 years following signing of this ROD Amendment. However, there are several issues (described below) that could impact this time frame.

10.6 Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative from design through construction. The availability of the services and materials required during implementation is also considered.

The No-Additional-Action Alternative is not evaluated for this criterion because nothing new is implemented. As described above, the implementability evaluation incorporates several factors. Each of these is discussed separately in the following text.

Technical Feasibility: Alternative 2 employs extraction, treatment, conveyance, and treated water use technologies that are widely used and generally considered proven and reliable. No significant difficulties are expected in construction and operation of these technologies, and the monitoring systems are generally already in place.

Alternative 2 would not interfere with the implementation of future response actions in the Whittier Narrows area.

Administrative Feasibility: Implementing Alternative 2 will require agreements with the U.S. Army Corps of Engineers for the construction of extraction wells, treatment facilities, and conveyance facilities. In addition, rights to the groundwater in the San Gabriel and Central Basins are assigned to specified parties and in most instances are not transferable between basins. EPA does not possess water rights in either basin. Therefore, implementing Alternative 2 will require resolution of the following administrative issues associated with groundwater extraction and discharge of treated water to local water purveyors or to the Montebello Forebay spreading facilities:

- If EPA extracts contaminated groundwater, treats it, and provides it to local water purveyors, the purveyors will need to reach an agreement with water management agencies to exercise the purveyor's water rights to account for the OU-related extraction.
- If EPA extracts contaminated groundwater, treats it, and provides it to local water purveyors, EPA will most likely have to treat water to below detection limits for VOCs and other industrial contaminants. EPA has determined that this level of treatment will probably be necessary because of requirements imposed on purveyors by the California Department of Health Services and potential customer concerns.
- If treated water is used by purveyors that do not have water rights in the basin from which the groundwater is extracted, the respective basin's adjudication (and possibly the Long Beach Judgment) may need to be amended to allow for the extraction and exportation of the groundwater.
- If EPA delivers treated water to water purveyors, agreements will need to be reached regarding the amount of water each purveyor will accept; the delivery location; responsibility for capital improvements to water systems; and operational, liability, financial, and other arrangements.
- If water purveyors serve treated groundwater to their residential customers, the purveyors will need to obtain appropriate permits from the California Department of Health Services. Department policy generally requires that permits impose more stringent treatment requirements on purveyors that serve water extracted and treated as part of a groundwater cleanup action.
- If treated water is discharged to the San Gabriel River and/or Rio Hondo for downstream diversion into spreading facilities, an agreement with LACDPW will be needed to ensure that the water is diverted and recharged. The agreement will also need to specify that the County will notify the remediation system operator when there is insufficient capacity in the spreading grounds to recharge all of the extracted groundwater. This would allow the operator to temporarily shutdown extraction or reduce the extraction rate and prevent the water from discharging to the ocean.
- If treated water is discharged to the San Gabriel River or Rio Hondo, the chemical-specific and action-specific ARARs identified in Section 12 would need to be met.

Amending the San Gabriel Basin, Central Basin, and Long Beach Judgments to facilitate remedial action in Whittier Narrows is potentially achievable, provided the remedial action is designed and implemented in a manner that does not unfairly benefit or harm any of the parties to the judgments.

Availability of Services and Materials: Implementation of Alternative 2 will require fabrication of treatment plant equipment. Required services and materials are believed to be readily available, including qualified contractors for construction and operation.

10.7 Cost

This criterion addresses the total cost of each alternative. This includes short- and long-term capital and O&M costs. The following cost elements are considered for each alternative.

- **Capital Cost.** Direct capital cost includes the cost of construction, labor, equipment, land, site development, and service cost. Indirect capital cost includes engineering fees; license; property easements; and permit cost, startup, and shakedown cost and contingencies.
- **O&M Cost.** Annual O&M cost includes operating labor cost, maintenance materials and labor, pumping and treatment energy costs, monitoring costs, and all other post-construction costs necessary to ensure continuous effective operation of the alternative.
- **Total Present Worth.** The total present worth of each alternative is calculated at an interest rate of 5 percent and a time period of 30 years. Total present worth for each alternative includes capital cost plus the present worth of both the re-capitalization and the annual O&M costs.

The cost estimates are considered order-of-magnitude level estimates (i.e., the cost estimates have an expected accuracy of +50 to -30 percent). The assumption of a 30-year operating period is based on EPA guidance and does not reflect any specific finding regarding the duration of the remedy.

Although there are no additional facilities constructed or operated under the No-Additional-Action Alternative, there have been and will continue to be groundwater monitoring costs. These costs are estimated to be $167,000/year. This results in a total net present worth for thirty years of monitoring, at a 5 percent discount rate, of $1,728,000. The No-Additional-Action Alternative also would have substantial financial impacts on local water purveyors or their ratepayers because of the continued migration of contamination and its impact on production wells in Whittier Narrows and the Central Basin.

For Alternative 2, cost estimates have been prepared for Scenarios A and B. This should provide a reasonable range of the estimated costs to implement this alternative. The estimated capital and O&M costs for Alternative 2, Scenarios A and B are as follows:

Alternative/Scenario	Capital	Recapitalization Costs- Present Value	O&M(Annual)	Net Present Value
2A	$9,739,000	$67,000	$612,000	$19,746,000
2B	$6,643,000	$46,000	$607,000	$16,450,000

The O&M cost estimates assume a long-term average flow rate of 7,500 gpm. This long-term average rate is lower than the 9,000-gpm flow rate that the computer simulations indicate will

ultimately be needed for capture. This lower flow rate takes into account the presumption that lower flow rates would be needed early in the project life because the current width of the contaminated area is smaller than the target area used in the simulations. Further, the long-term flow rate needed for containment will likely decline as remediation progresses in upgradient areas, reducing the size of the contaminated area reaching Whittier Narrows.

10.8 State Acceptance

The State of California has provided comments and feedback to EPA throughout the RI/FS process for the WNOU. In a letter dated October 21, 1999, the California Department of Toxic Substance Control (DTSC), as lead agency for the state, concurred with EPA's selected remedy. In addition, the RWQCB approved EPA's selected remedy in a letter dated September 14, 1999.

10.9 Community Acceptance

Individuals representing a number of local stakeholders made oral comments at the public meeting held in November 1998 expressing strong support for EPA's preferred alternative. In addition, EPA received several questions at the public meeting and responded directly to these at the meeting. The entire transcript for the public meeting is included the Administrative Record for this site. The Administrative Record file is available at EPA's Superfund Records Center at EPA's Regional Office in San Francisco, and locally at two information repositories: the West Covina Library and the Rosemead Library.

During the public comment period for the Proposed Plan, EPA received written comments from two of the agencies that had provided oral comments at the public meeting supporting EPA's preferred remedy. These written comments are similar to the oral comments and generally very supportive of EPA's preferred remedy. EPA also received written comments from three organizations representing South El Monte OU industries. These written comments generally claim that EPA does not provide sufficient basis for the remedy selected and should perform additional evaluations and consider other remedial approaches before selecting a remedy. All of the written comments, along with EPA's responses to them, are presented in the Responsiveness Summary.

The local stakeholders that provided comments expressed strong support for EPA's proposed remedy. A handful of commenters did not believe that EPA's evaluations sufficiently justified the proposed remedy. EPA has determined that none of the issues raised in the comments warrant a change to the overall remedy that EPA identified in the Proposed Plan. The preferred alternative presented in the Proposed Plan represents the most appropriate remedy for the WNOU.

11 Selected Remedy

After considering CERCLA's statutory requirements, the detailed comparison of the alternatives using the nine Superfund evaluation criteria, and public comments, EPA, in consultation with the State of California has determined that the most appropriate remedy for the WNOU is Alternative No. 2: Groundwater Containment Near Whittier Narrows Dam. The selected remedy will provide containment of contaminated groundwater migrating through Whittier Narrows. By providing containment near the dam, EPA can best control contaminant migration, reduce risks from potential exposure to the contaminated groundwater, and protect the area's groundwater resource.

This remedy meets the two Superfund threshold evaluating criteria, overall protection of human health and the environment and compliance with ARARs, and provides the best balance of the remaining Superfund evaluation criteria. The major components of the selected remedy for this action include:

- Groundwater containment through extraction at or near the downgradient limit of contaminant concentrations exceeding Maximum Contaminant Level (MCLs) or other relevant and appropriate standards. This location is near Whittier Narrows Dam;

- Groundwater treatment at a treatment facility (or facilities), using air stripping with vapor-phase granular activated carbon adsorption for off-gas treatment and, potentially, liquid-phase granular activated carbon treatment (other treatment technologies may be evaluated during remedial design);

- If 1,4-dioxane concentrations in the extracted groundwater exceed the State action level, additional or alternative treatment facilities using technologies such as ultraviolet oxidation may be required;

- Conveyance systems (i.e., pipelines, booster pumps) to transport contaminated groundwater from the wells to the treatment plant and treated water from the plant to the designated end use;

- Treated water end-use by local water purveyors or, as a secondary option, recharge of the treated water back to the aquifer using existing Montebello Forebay or other spreading facilities;

- Groundwater monitoring to help optimize system design, measure the performance of the containment system and provide early warning of upgradient conditions that could affect the system.

It is important to note that during remedial design EPA intends to consider a variety of implementation options to develop the most cost-effective remedy implementation. As an example, this could include phased implementation, where individual components are constructed in stages to ensure that the facilities are definitely needed for containment before

they are installed. Another scenario could involve construction of multiple, focused containment actions that may be able to more effectively capture contamination migrating through Whittier Narrows than a single, large-scale extraction barrier. Although variations such as these could potentially result in lower total flow rates and reduced operations costs, they could also increase capital costs and make it difficult to reach agreements with purveyors to accept the treated water because of the changing flow rates. EPA will maintain ongoing communications with local stakeholders during remedial design to facilitate this evaluation process.

The following sections describe the objectives for the various components of the selected remedy. EPA will review the selected remedy no less often than every five years after the initiation of the remedial action to ensure that the implemented remedy is protecting human health and the environment. As part of the review, EPA will evaluate whether objectives specified in this ROD Amendment remain protective of human health and the environment. EPA will continue five-year reviews until no hazardous substances, pollutants, or contaminants remain in WNOU groundwater above levels of concern for human health and the environment.

11.1 Groundwater Containment

The objective for the groundwater containment component of the selected remedy is to control migration of contaminated groundwater in the San Gabriel Basin so that groundwater extracted from Whittier Narrows and Montebello Forebay production wells will not exceed chemical-specific ARARs. Where required, groundwater containment shall be achieved using wells designed to extract groundwater from appropriate locations and depths.

Groundwater containment will be required in portions of the WNOU where groundwater contaminated in excess of the chemical-specific ARARs is migrating through Whittier Narrows towards the Montebello Forebay. The chemical-specific ARARs for the chemicals of concern that were identified in the Baseline RA and Addenda are shown in Table 5.

Available groundwater monitoring data indicate that areas of shallow and intermediate groundwater approaching the Whittier Narrows Dam exceed the chemical-specific ARARs, indicating that containment is currently required. These general areas are shown on Figures 2 and 3 as the zones where VOCs exceed MCLs. EPA will continue to perform groundwater monitoring during remedial design to identify any additional areas or depths (beyond those shown in Figures 2 and 3) where groundwater containment is needed.

To the extent possible, groundwater extraction for containment shall occur north of the Whittier Narrows Dam to minimize the amount of contamination that reaches the Montebello Forebay portion of the Central Basin and to help protect the City of Whittier's wellfield. This scenario conforms generally with Scenario A for Alternative 2. The exact well locations and extraction rates shall be determined based on evaluation of local hydrogeologic and groundwater quality data and computer simulations of extraction well capture zones. The extraction system shall be designed to provide only the extraction necessary to adequately encompass the contaminated areas.

During remedial design, EPA shall identify the monitoring points to be used to assure that containment goals are met. In general, these points shall be in the vicinity of the Whittier Narrows Dam, as described in detail in Section 11.4.

Groundwater containment will be required until groundwater contaminated in excess of chemical-specific ARARs is no longer migrating through Whittier Narrows. At regular intervals the size of the target area for containment shall be updated and the extraction system evaluated to optimize extraction rates and locations. Portions of the containment system where groundwater concentrations no longer exceed ARARs may be shut down while other portions continue to operate.

If the extraction system does not effectively control contaminant migration, additional measures shall be taken to bring the system into compliance. Such measures may include more closely spaced extraction wells or higher extraction rates to increase hydraulic control. EPA may also evaluate whether more extensive groundwater monitoring is required to ensure that concentrations in groundwater are not increasing.

11.2 Groundwater Treatment

Extracted groundwater shall be treated for contaminants that exceed drinking water standards by air stripping (with off-gas controls), or liquid-phase granular activated carbon (LGAC) adsorption. A secondary, LGAC adsorption treatment process may also be utilized if the final end use for the treated water requires treatment below MCLs. Other treatment technologies may be used if they can achieve the required treatment standards. At a minimum, the treated water shall meet the Federal and State primary MCLs. If air stripping is used, off-gas controls (e.g., vapor-phase granular activated carbon (VGAC)) shall be used to reduce air emissions in accordance with ARARs presented in Section 12. If alternative treatment technologies are identified, EPA will evaluate the alternative in accordance with the criteria specified in 40 CFR Section 300.430 during remedial design. Other technologies may also be considered if other contaminants, which require different treatment technologies are identified at concentrations above ARARs.

Additional treatment technologies may be necessary if other contaminants, requiring different treatment processes are identified at concentrations above ARARs in Whittier Narrows. As an example, 1,4-dioxane is a VOC that has been detected in the upgradient South El Monte OU at concentrations exceeding its chemical specific ARAR. The treatment processes described above (air stripping and LGAC adsorption) are not very effective at removing 1,4-dioxane from groundwater. One treatment process that does work on 1,4-dioxane is ultraviolet (UV) irradiation with the addition of an oxidizing chemical such as hydrogen peroxide. This process is commonly known as UV/oxidation. If it was necessary to add UV/oxidation to the treatment systems already in place, overall costs could double (CH2M Hill, 1999b). UV/oxidation can also treat the other VOCs present in Whittier Narrows in groundwater. Thus, if installation of UV/oxidation becomes necessary to address 1,4-dioxane, the UV/oxidation process could potentially replace the air stripping or carbon adsorption treatment currently planned for VOCs. In this case, costs would still be substantially higher than those described below in Section 11.5, but the total remedy costs would not double.

Final decisions on the location (or locations) of the treatment facilities will be made during remedial design. If any treatment facilities are located within a 100-year floodplain, they

will be capable of withstanding a 100-year flood as required by ARARs (see Section 12.2.1 below). Further, any reduction in flood control capacity behind Whittier Narrows Dam resulting from construction of treatment facilities will be mitigated.

The treatment system will be designed to achieve the chemical-specific applicable or relevant and appropriate requirements (ARARs) identified in Section 12 of this ROD Amendment under all operating conditions. If the water is used by a purveyor for off-site domestic use, the treatment system may need to meet additional requirements imposed on the purveyor by the California Department of Health Services (DHS).

If the treated water is used for groundwater recharge, the treatment system shall comply with requirements that would be identified by the LARWQCB.

11.3 Conveyance Systems and Treated Water End Use

The selected remedy will include pipelines, well pumps, pump stations, and other conveyance facilities needed to transport the extracted groundwater from the extraction wells to the treatment plant and the treated groundwater from treatment plant to one or more delivery locations.

If treated water is supplied to one or more water purveyors the delivery location or locations shall be at a pipeline, storage reservoir, or other portion of the purveyor's distribution system. The purveyor would be responsible for distributing the water to its customers through its existing systems. Depending on the location of the connection point in the water purveyor's system, chlorination may be required prior to delivery. If multiple water purveyors receive treated water, the individual conveyance systems to each purveyor shall be designed with excess capacity to provide operational flexibility.

EPA's preference is that treated water be delivered to water purveyors. The advantages of supplying water to purveyors include reduced pumping costs, and, potentially, reduced extraction from existing wells that may be impacted or threatened by contamination or may be affecting contaminant migration.

The final decision on whether treated groundwater will be delivered to one or a combination of purveyors will be made during remedial design. The decision will be depend in part on the costs associated with pumping and delivering the water and institutional constraints. EPA will need to make arrangements with water purveyors regarding the design, construction, operation, and maintenance of facilities, financial responsibilities and possibly water rights.

If agreements cannot be reached with water purveyors to accept the treated water, water shall be discharged for subsequent groundwater recharge. The most likely discharge location for treated water is to the Rio Hondo. Treated water discharged to the Rio Hondo would be diverted into downstream spreading grounds for groundwater recharge. The remedy could also potentially include recharge within the San Gabriel Basin behind Whittier Narrows Dam. If recharge is necessary, recharge locations will be determined during remedial design.

11.4 Groundwater Monitoring

The remedy includes a groundwater monitoring program. This includes installation and sampling of new groundwater monitoring wells, sampling of existing monitoring and production wells, and measuring water levels in monitoring and production wells. The objectives of the monitoring plan are to:

- Refine the boundaries of the contaminated areas in Whittier Narrows that require containment to help determine pumping configurations;
- Refine contaminant influent concentration estimates used in the design of treatment facilities;
- Continue to monitor for other contaminants that may pose a threat to human health or the environment;
- Monitor the effectiveness of the containment barrier in containing contaminant migration;
- Provide information to optimize operation of the extraction and treatment systems;
- Provide early warning of upgradient conditions that could impact the containment system, such as increases or decreases in the lateral or vertical extent of contamination, increases or decreases in contaminant concentrations, or detection of new contaminants, that could necessitate extraction rate or treatment plant modifications;
- Provide information to evaluate the need for additional remedial actions in the Whittier Narrows area or upgradient areas; and
- Provide information on the potential presence of additional contaminants in the groundwater.

There is already a fairly extensive groundwater monitoring network in Whittier Narrows established by the prior Whittier Narrows ROD and subsequent investigations. The existing groundwater monitoring program (as described in Feasibility Study Addendum [EPA, 1998b]) is expected to meet most of the monitoring requirements for the selected remedy.

During remedial design, EPA will determine the need for any additional monitoring wells. Additional piezometers or monitoring wells may be required for the purpose of measuring hydraulic head at multiple depths in the aquifer in the vicinity of the extraction wells as a supplement to existing monitoring wells and piezometers in the area .

The ongoing groundwater monitoring, augmented as determined by EPA, shall continue during the remedial design phase to establish pre-implementation baseline conditions in the Whittier Narrows vicinity. During operation of the remedy, the monitoring program shall include periodic water level measurements collected from new and existing wells and piezometers in Whittier Narrows to evaluate remedy performance. The monitoring program will also include periodic water quality sampling event.

Water quality parameters will primarily consist of VOCs, with periodic monitoring of other parameters such as nitrate, total dissolved solids, and general minerals. However, additional parameters may be needed to provide data for treatment plan design and system operations.

The remedy shall also include monitoring to meet DHS domestic water supply requirements or LARWQCB discharge requirements, depending on the end use of the treated water. At a minimum, this shall include routine monitoring of treatment plant influent and effluent.

11.5 Summary of the Estimated Remedy Costs

A detailed breakdown of the estimated capital, operating and maintenance (O&M), and present worth costs associated with the selected remedy are included in Tables 6A and 6B. The present worth costs assume a 5% discount rate and a 30 year project duration. These cost estimates are expected to be accurate within a range of +50 to -30%. Because there are a variety of implementation options for the selected remedy, the costs are presented as a range of potential costs. In particular, the end use option selected (delivery to purveyors or groundwater recharge) will affect the costs of several remedy components. The total estimated capital cost ranges from $6.64 to $9.74 million. The estimated re-capitalization costs (to replace worn equipment) range from $0.48 to $0.70 million and the estimated annual O&M costs are approximately $0.61 million for either end use scenario. The estimated annual O&M costs for delivery to water purveyors assumes an annual purveyor reimbursement of avoided pumping costs of $0.56 million. The total present worth cost estimate for the remedy ranges from $16.5 to $19.7 million.

11.6 Expected Outcomes of the Selected Remedy

Once implemented, this remedy will protect the existing beneficial uses of the currently uncontaminated and slightly--contaminated aquifers downgradient of Whittier Narrows Dam in the Montebello Forebay portion of the Central Basin. This includes protection of the critical recharge areas in the Montebello Forebay where all of the Central Basin aquifers are present and are recharged. The remedy will allow for continued use of the Montebello Forebay as a source of drinking water supply. In addition, the remedy will minimize the potential impacts to production wells currently operating within Whittier Narrows.

Because the interim remedial action selected in this ROD Amendment is for containment and not restoration, no final cleanup standards have been established for restoration of groundwater. This means that at least a portion of the shallow and intermediate zones upgradient of the extraction systems will likely remain contaminated and unusable for a considerable length of time, potentially decades. The length of time needed for restoration depends on any remedial actions in upgradient source areas and any subsequent remedial actions in Whittier Narrows.

12 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d) requires that remedial actions at CERCLA sites attain (or justify the waiver of) any federal or state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate. These applicable or relevant and appropriate requirements are referred to as "ARARs." Federal ARARs may include requirements promulgated under any federal environmental laws. State ARARs may only include promulgated, enforceable environmental or facility-siting laws of general application that are more stringent or broader in scope than federal requirements and that are identified by the state in a timely manner.

An ARAR may be either "applicable," or "relevant and appropriate," but not both. If there is no specific federal or state ARAR for a particular chemical or remedial action, or if the existing ARARs are not considered sufficiently protective, then other guidance or criteria to be considered (TBCs) may be identified and used to ensure the protection of public health and the environment. The NCP, 40 C.F.R. Part 300, defines "applicable," "relevant and appropriate," and "to be considered" as follows:

- **Applicable requirements** are those cleanup standards, standards of control, or other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

- **Relevant and appropriate requirements** are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and that are more stringent than federal requirements may be relevant and appropriate.

- **TBCs** consist of advisories, criteria, or guidance that EPA, other federal agencies, or states developed that may be useful in developing CERCLA remedies. The TBC values and guidelines may be used, as EPA deems appropriate.

ARARs are identified on a site-specific basis from information about the chemicals at the site, the remedial actions contemplated, the physical characteristics of the site, and other appropriate factors. ARARs include only substantive, not administrative, requirements, and pertain only to onsite activities. Offsite activities must comply with all applicable federal, state, and local laws,

including both substantive and administrative requirements, that are in effect when the activity takes place. There are three general categories of ARARs:

- **Chemical-specific** ARARs are health- or risk-based concentration limits, numerical values, or methodologies for various environmental media (i.e., groundwater, surface water, air, and soil) that are established for a specific chemical that may be present in a specific media at the site, or that may be discharged to the site during remedial activities. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR include state and federal drinking water standards.

- **Location-specific** ARARs set restrictions on certain types of activities based on site characteristics. Federal and state location-specific ARARs are restrictions placed on the concentration of a contaminant or the activities to be conducted because they are in a specific location. Examples of special locations possibly requiring ARARs may include floodplains, wetlands, historic places, and sensitive ecosystems or habitats.

- **Action-specific** ARARs are technology- or activity-based requirements that are triggered by the type of remedial activities under consideration. Examples of this type of ARAR are RCRA regulations for waste treatment, storage, or disposal.

EPA has evaluated and identified the ARARs for the selected remedy in accordance with CERCLA, the NCP, and EPA guidance, including the *CERCLA Compliance with Other Laws Manual, Part I (Interim Final)*, OSWER Directive 9234.1-01 (EPA, 1988a) and *CERCLA Compliance with Other Laws Manual, Part II*, OSWER Directive 9234.1-02 (EPA, 1989).

12.1 Chemical-specific ARARs

Chemical-specific ARARs standards for chemicals of concern that were identified in the Baseline RA and Addenda are shown in Table 5.

12.1.1 Federal Drinking Water Standards

EPA has established MCLs, 40 CFR. Part 141, under the Safe Drinking Water Act (SDWA), 42 U.S.C. §§ 300f-j, to protect public health from contaminants that may be found in drinking water sources. MCLs are applicable at the tap for water that is delivered directly to 25 or more people or to 15 or more service connections.

Under the SDWA, EPA has also designated Maximum Contaminant Level Goals (MCLGs), 40 C.F.R. Part 141, which are health-based goals that may be more stringent than MCLs. MCLGs are set at levels, including an adequate margin of safety, where no known or anticipated adverse health effects would occur. MCLGs greater than zero are relevant and appropriate where multiple contaminants in groundwater or multiple pathways of exposure present unacceptable health risks (EPA, 1988b). None of the chemicals of concern in WNOU groundwater has an MCLG that is more stringent than its MCL.

Under Section 300.430(f)(5) of the NCP, remedial actions must generally attain MCLs and nonzero MCLGs if the contaminated water is a current or potential source of drinking water. The groundwater aquifers of the WNOU and in the downgradient Montebello Forebay are currently used as sources of drinking water. For this ROD Amendment, EPA has determined

that the federal MCLs listed in Table 5 are ARARs for any groundwater that is treated and used for domestic, municipal, industrial, or agricultural purposes, and for any groundwater that is discharged to the environment. In addition, these MCLs are ARARs for currently uncontaminated groundwater in the Montebello Forebay downgradient of Whittier Narrows Dam (EPA, 1988a).

If treated groundwater is to be delivered into a public water supply, all legal requirements for drinking water in existence at the time that the water is served will have to be met because EPA considers the service of water to the public to be an offsite activity.

12.1.2 California Drinking Water Standards

California has established state MCLs for sources of public drinking water, under the California Safe Drinking Water Act of 1976, Health and Safety Code (H&SC) §§ 4010.1 and 4026(c), California Code of Regulations (CCR) Title 22, §§ 64431 and 64444. Some state MCLs are more stringent than the corresponding federal MCLs. EPA has determined that the more stringent state MCLs are relevant and appropriate for the WNOU. There are also some chemicals that lack federal MCLs. Where state MCLs exist for chemicals that lack federal MCLs, EPA has determined that the state MCLs are relevant and appropriate for the WNOU. State MCLs apply to remedial actions in the WNOU in the same manner as federal MCLs. Table 5 identifies the state MCLs for the chemicals of concern for this remedial action.

If contaminants not listed in Table 5 are detected during implementation of the remedy, their state or federal MCLs (or non-zero MCLGs), whichever is lower, shall be ARARs for containment and treatment of the groundwater. If a contaminant is detected that does not have established MCLs or MCLGs, EPA will evaluate available standards and information to identify a relevant and appropriate standard for the contaminant.

State Action Levels

One chemical of concern detected in the WNOU groundwater, 1,4-dioxane, does not have an MCL or nonzero MCLG. For contaminants lacking MCLs and MCLGs, EPA refers to other available criteria and guidance (TBCs). The California Department of Health Services has set an action level of 3 parts per billion (ppb) for 1,4-dioxane (CADHS, 1999). An action level is the concentration of a contaminant in drinking water, at which the Department has determined, based on available scientific information, that there is an adequate margin of safety to prevent potential risks to human health. California Health and Safety Code section 116455 requires operators of public water systems to notify local governments when a drinking water well exceeds an action level. In practice, drinking water wells that exceed action levels are almost always shut down or have treatment added. EPA has determined that all treated groundwater that is served as drinking water or discharged to the environment shall be treated to comply with the state action level of 3 ppb for 1,4-dioxane.

12.2 Location-specific ARARs

This ROD Amendment does not specify the exact location of remediation facilities (e.g., wells, treatment plant, and pipelines). Locations of remediation facilities will be determined during the remedial design, and will conform to the location-specific ARARs identified below.

12.2.1 Location Standards for TSD Facilities

California Code of Regulations, Title 22, Section 66264.18 establishes location standards for Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDFs). Subsection 66264.18(a) prohibits the placement of TSDFs within 200 feet of a fault displaced during the Holocene epoch. Subsection 66264.18(b) requires that TSDFs located within a 100-year floodplain be capable of withstanding a 100-year flood. These standards are applicable to the construction of any new groundwater treatment facilities used as part of this remedial action.

12.2.2 Endangered Species Act

The Endangered Species Act, 15 U.S.C. §§ 1531-1544, and implementing regulations, 40 C.F.R. § 6.302(h), 50 C.F.R. Parts 17, 222 and 402, are applicable to any remedial actions that impact a proposed or listed threatened or endangered species or destroy or adversely modify the critical habitat of a listed species. The Preliminary Baseline RA for the WNOU identified native plant communities, wildlife, special-status species, and sensitive habitat within the general area of the WNOU. There are indications that the least Bell's vireo, a listed endangered species, may be present in a portion of the OU. The construction of remedial action facilities is not expected to impact potential habitat because the likely locations of wells, pipelines, etc. are along roads and other disturbed areas. The final locations of the remedial facilities will be determined during remedial design. At that time, EPA will consult with the U.S. Fish and Wildlife Service in accordance with 50 CFR Part 402 and the USACE to ensure that regulatory requirements are followed to avoid adverse impacts or conduct appropriate mitigation.

12.2.3 California Fish and Game Code

California Fish and Game Code sections 2080, 5650(a), (b), and (f), 12015, and 12016 prohibit the discharge of harmful quantities of hazardous materials into places that may deleteriously affect fish, wildlife, or plant life. These provisions are applicable if the remedial action will result in the discharge of treated groundwater to surface waters.

12.2.4 Archaeological and Historic Preservation Act

This statute and implementing regulations, 16 U.S.C. § 469, 40 C.F.R. Part 6.301(c), establish requirements for the evaluation and preservation of historical and archaeological data that may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program. There are several documented archeological sites within the Whittier Narrows Flood Control Basin. These requirements are applicable if the remedial action will interfere with any of these facilities.

12.2.5 Historic Sites, Buildings, and Antiquities Act

The Historic Sites, Buildings, and Antiquities Act, 16 U.S.C. §§ 461-467, 40 C.F.R. Part 6.301(a), requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks. The remedial action is not anticipated to affect any of the facilities regulated under the act. However, during preliminary design, a complete review will be made of impacted areas.

12.3 Action-specific ARARs

The action-specific ARARs described below are intended to address those actions that would result from implementation of the remedy.

12.3.1 Local Air Quality Management

Air stripping may be used as a VOC treatment technology. Air emissions from air strippers are regulated by the California Air Resources Board, which implements the federal Clean Air Act, as well as the air pollution control requirements of the California H&SC, through local air quality management districts. Local districts may impose additional regulations to address local air emission concerns. The local air district for the WNOU is the South Coast Air Quality Management District (SCAQMD). The SCAQMD has adopted several rules that are ARARs for air stripper emissions and construction activities.

SCAQMD Regulation XIII, comprising Rules 1301 through 1313, establishes new source review requirements. Rule 1303 requires that all new sources of air pollution in the district use best available control technology (BACT) and meet appropriate offset requirements. Emissions offsets are required for all new sources that emit in excess of one pound per day.

SCAQMD Rule 1401 requires that best available control technology for toxics (T-BACT) be employed for new stationary operating equipment, so that the cumulative carcinogenic impact from air toxics does not exceed the maximum individual cancer risk limit of 10 in 1 million (1×10^{-5}). Many of the contaminants found in the WNOU groundwater are air toxics subject to Rule 1401.

SCAQMD Rules 401 through 403 are also ARARs for construction and operation of remedial action facilities. SCAQMD Rule 401 limits visible emissions from a point source. Rule 402 prohibits discharge of material that is odorous or causes injury, nuisance, or annoyance to the public. Rule 403 limits downwind particulate concentrations.

12.3.2 Federal Clean Water Act and California Porter-Cologne Water Quality Act

California's Porter-Cologne Water Quality Act incorporates the requirements of the federal Clean Water Act and implements additional standards and requirements for surface and groundwaters of the state.

12.3.2.1 Water Quality Control Plan for the Los Angeles Region (Basin Plan)

The RWQCB formulates and enforces water quality standards through a Basin Plan. The Basin Plan identifies the beneficial uses of surface and groundwaters in the San Gabriel River and Rio Hondo watersheds and establishes water quality objectives necessary to protect these beneficial uses. Water quality objectives impose limitations on receiving waters, rather than discharges, and are applicable to any water body that receives discharge from remedial activities in the WNOU.

The selected remedial action could potentially result in the discharge of treated groundwater to either the Rio Hondo or the San Gabriel River. The Basin Plan identifies the following beneficial uses for the relevant segment of the San Gabriel River:

- Municipal and domestic supply (potential beneficial use)

- Industrial process supply (potential beneficial use)
- Industrial service supply (potential beneficial use)
- Groundwater recharge (intermittent beneficial use)
- Water contact recreation (existing beneficial use)
- Non-contact water recreation (existing beneficial use)
- Warm freshwater habitat (intermittent beneficial use)
- Wildlife habitat (existing beneficial use)
- Rare, threatened, or endangered species (existing beneficial use)

The beneficial uses for the relevant segment of the Rio Hondo are:

- Municipal and domestic supply (potential beneficial use)
- Groundwater recharge (intermittent beneficial use)
- Water contact recreation (intermittent beneficial use)
- Non-contact water recreation (existing beneficial use)
- Warm freshwater habitat (potential beneficial use)
- Wildlife habitat (intermittent beneficial use)
- Rare, threatened, or endangered species (existing beneficial use)
- Wetland habitat (existing beneficial use)

Because municipal and domestic water supply is a potential beneficial use of these surface waters, Federal and State MCLs and MCLGs are applicable as water quality objectives for both rivers. In addition, the following water quality objectives from the Basin Plan are ARARs for the San Gabriel River and Rio Hondo in the WNOU vicinity:

- Total Dissolved Solids: 750 mg/L
- Sulfate: 300 mg/L
- Chloride: 150 mg/L
- Boron: 1.0 mg/L
- Nitrogen (NO3-N + NO2-N): 8 mg/L

12.3.2.2 State Water Resources Control Board Resolution 68-16

The Basin Plan also incorporates the State Water Resources Control Board (SWRCB) policy "Statement of Policy with Respect to Maintaining High Water Quality in California" (Resolution 68-16). Resolution 68-16 requires that existing water quality be maintained unless it is demonstrated that a change will benefit the people of California, will not unreasonably affect present or potential uses, and will not result in water quality less than prescribed by other state policies. Any activity that may increase the volume or concentration of a waste discharged to surface or groundwater is required to use the "best practicable treatment or control."

Resolution 68-16 will be applicable if the remedy discharges treated groundwater to either the Rio Hondo or the San Gabriel River.

12.3.2.3 State Water Resources Control Board Resolution 92-49

Subsection III.G of the SWRCB's "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304" (Resolution 92-49) requires attainment of background water quality or, if background levels cannot be restored, the best quality of water that is reasonable. Resolution 92-49 is not an ARAR because this is a remedial

action intended to contain the spread of contamination, rather than a final action intended to restore groundwater in the WNOU.

12.3.2.4 Standards Applicable to CERCLA Section 104(b) Discharges to Surface Waters

Site investigation activities undertaken pursuant to CERCLA § 104(b) are considered to be removal actions. It is EPA policy that removal actions "comply with ARARs to the extent practicable, considering the exigencies of the circumstances." (55 Fed. Reg. 8756).

It is possible that certain site investigation activities will take place during remedial design, which will result in temporary high-flow, high-volume discharges of contaminated groundwater (e.g., discharges from aquifer testing and spinner logging/depth-specific sampling of water supply wells). EPA has considered the best available technology economically achievable (BAT) for treatment and disposal of these discharges. The three disposal options that EPA considered are: (1) onsite storage and disposal at a Resource Conservation and Recovery act (RCRA)-approved hazardous waste facility, (2) discharge to a sanitary sewer for treatment at a wastewater treatment plant, and (3) onsite treatment and discharge to surface water channels. EPA has concluded that compliance with chemical-specific ARARs is not practicable, considering the exigencies of the circumstances, for many temporary high-flow, high-volume discharges.

EPA has determined that compliance with chemical-specific ARARs is practicable and necessary for CERCLA § 104(b) activities that do not result in temporary high-flow, high-volume discharges. EPA will determine the application of chemical-specific ARARs to CERCLA § 104(b) activities on a case-by-case basis. Where practicable, these discharges must comply with ARARs.

12.3.3 California Hazardous Waste Management Program

The federal RCRA establishes requirements for the management and disposal of hazardous wastes. In lieu of the federal RCRA program, the State of California is authorized to enforce its Hazardous Waste Control Act, and implement regulations (CCR Title 22, Division 4.5), subject to the authority retained by EPA in accordance with the Hazardous and Solid Waste Amendments of 1984. California is responsible for permitting treatment, storage, and disposal facilities within its borders and carrying out other aspects of the RCRA program. Some of the Title 22 regulations are applicable to the generation and disposal of hazardous wastes in the WNOU.

12.3.3.1 Hazardous Waste Generator Requirements

CCR Title 22 establishes requirements applicable to generators of hazardous waste. Implementation of the remedial action may generate hazardous waste as a result of groundwater monitoring and well installation (e.g., contaminated soil and groundwater and used personal protective equipment). Hazardous waste may also be generated as a result of groundwater treatment to remove VOCs (e.g., spent carbon). These requirements are applicable to remedial actions in the WNOU.

The preamble to the NCP clarifies that when noncontiguous facilities are treated as one site, the movement of hazardous waste from one facility to another is subject to RCRA manifest requirements (55 Fed. Reg. 8691). Manifest requirements are ARARs in the event that the

remedial action involves multiple water treatment units at different locations and requires the movement of hazardous wastes (e.g., spent carbon) between these locations.

12.3.3.2 Land Disposal Restrictions

CCR Title 22 defines hazardous wastes that cannot be disposed of to land without treatment. Land disposal requirements are applicable to the disposal of spent carbon generated during the treatment of groundwater for removal of VOCs, if carbon adsorption is used, and the disposal of residuals associated with groundwater monitoring and well installation (e.g., contaminated soil and groundwater, used personal protective equipment).

12.3.3.3 Hazardous Waste TSD Facility Requirements

CCR Title 22, Division 4.5, Chapter 14, specifies Hazardous Waste TSDF requirements that regulate the design, construction, operation, and closure of RCRA-permitted TSDFs. Since the contaminated groundwater is sufficiently similar to RCRA hazardous wastes, Title 22 TSDF requirements are relevant and appropriate for the design, construction, operation, and closure of any ground-water treatment systems. The Title 22 ARARs include the substantive requirements of the following provisions:

- Section 66264.14: Security Requirements
- Section 66264.25: Seismic and Precipitation Standards
- Section 66264.94: Groundwater Protection Standards
- Sections 66264.111-115: Closure of Treatment Units
- Sections 66264.170-178: Use and Management of Containers
- Sections 66264.600-603: Standards for Miscellaneous Treatment Units

12.4 ARARs Waivers

This remedial action will comply with all ARARs described in this section. Because this is an interim measure to contain contaminant migration, EPA has not established chemical-specific ARARs for restoration of the contaminated portions of the WNOU. These ARARs will be addressed in the Final ROD for the San Gabriel Valley Superfund Site.

13 Statutory Determinations

Under CERCLA Section 121, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ, as a principal element, treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes. The following sections discuss how the selected remedy meets these statutory requirements.

13.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment by limiting further downgradient migration of contaminated groundwater. The remedy will also remove contaminant mass from the aquifer. The selected remedy will reduce potential risks by decreasing the likelihood and magnitude of future exposure to contaminated groundwater. Contaminant concentrations in the groundwater in the areas to be addressed by the remedy are currently well above acceptable levels. Available treatment technologies are technically feasible and proven effective in meeting ARARs for the treated groundwater and air. Implementation of the remedy will not pose unacceptable short-term risks. In addition, no adverse cross-media impacts are expected.

13.2 Compliance with ARARs

The selected remedy shall comply with all ARARs described in Section 12 of this ROD Amendment. Because this is a groundwater containment action, EPA has not established chemical-specific ARARs for restoration of the groundwater.

13.3 Cost-Effectiveness

EPA believes the selected remedy is cost-effective for addressing migration of contaminated groundwater in Whittier Narrows. Section 300.430(f)(ii)(D) of the NCP requires EPA to determine cost-effectiveness by evaluating the cost of an alternative relative to its overall effectiveness. Effectiveness is defined by three of the five balancing criteria: long-term effectiveness, short-term effectiveness, and reduction of toxicity, mobility and volume through treatment. The overall effectiveness is then compared to the cost to ensure that the selected remedy is cost-effective.

The estimated present worth cost of the selected remedy ranges from $16,400,000 to $19,700,000. Although the No-Additional-Action Alternative is less expensive, migration of groundwater contamination through Whittier Narrows and into the Central Basin is not addressed. EPA

believes that the additional cost to contain contaminant migration provides a significant increase in protection of human health and the environment and is cost-effective.

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

As an interim remedial action, EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner in the WNOU. EPA has also determined that the selected remedy provides the best balance of tradeoffs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

The selected remedy satisfies the long-term effectiveness criterion by removing contamination from the groundwater and destroying the VOCs during carbon regeneration. Groundwater containment through extraction effectively reduces the mobility and volume of contaminants as well as the potential for exposure to site-related contamination. The selected remedy does not present any short-term risks that cannot be readily mitigated and EPA expects that the implementability issues associated with the selected remedy can be resolved in a timely manner.

13.5 Preference for Treatment as a Principal Element

By treating the contaminated groundwater through processes such as air stripping and carbon adsorption, the selected remedy addresses the site contamination through the use of treatment technologies. By using treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

13.6 Five-Year Reviews

Because the remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure, EPA shall conduct a review of the remedy at least once every 5 years after initiation of remedial action. The review will assess whether the remedy continues to provide adequate protection of human health and the environment. If it is determined that the remedy is no longer protective of human health and the environment, then modifications to the remedy will be evaluated and implemented as necessary.

14 Documentation of Significant Changes

The Proposed Plan for the WNOU was released for public comment in October 1998. The Proposed Plan identified Alternative 2: "Groundwater Containment Near Whittier Narrows Dam", as the Preferred Alternative for addressing groundwater contamination in Whittier Narrows. EPA reviewed written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

PART III
RESPONSIVENESS SUMMARY

Part III Responsiveness Summary

This Responsiveness Summary portion of the interim Record of Decision (ROD) presents the U.S. Environmental Protection Agency's (EPA) responses to the written and selected oral comments received at the public meeting and during the public comment period. The section is divided into responses to written comments and responses to oral comments. Comments are expressed in *italics*, EPA's responses in plain text.

1 Responses to Written Comments

This section provides responses to written comments received by EPA during the public comment period. Written comments were received from Allegheny Teledyne, Incorporated; Baker & McKenzie; and PES Environmental, Inc., Southeast Water Coalition and the Water Replenishment District of Southern California.

1.1 Responses to Comments from Allegheny Teledyne, Incorporated

Allegheny Teledyne Comment No. 1. *As stated in EPA's October 22, 1998 letter responding to comments on the Draft FS Addendum, results of recent groundwater sampling of three multiport wells at Whittier Narrows have shown concentrations of VOCs below MCLs. EPA's case manager stated in a communication transmitting these results to PRPs that the data "suggest that no immediate response is needed near the Dam." This new information undercuts EPA's conclusion that a high volume pump and treat system at the Whittier Narrows Dam is needed to prevent the migration of VOCs. Natural attenuation and other processes which EPA has not adequately accounted for may be reducing the concentrations of VOCs to these levels. The FS Addendum fails to adequately consider the effects of natural attenuation on future VOC concentrations south of the Dam.*

EPA's Response. The comment references an EPA statement that "no immediate response is needed near the Dam." EPA installed the three new multiport wells at the Dam to assess the need for EPA to initiate a separate accelerated action in addition to the remedy proposed in the ROD Amendment. Data from the wells indicated that a costly additional remedy is not needed. The referenced statement was not referring to the need for the overall Whittier Narrows remedy.

PCE concentrations have been detected in several intermediate zone monitoring points south of the Dam at or near the MCL in recent sampling events. Further, over the last two years, PCE concentrations just upgradient of the dam in both shallow and intermediate monitoring intervals have consistently exceeded MCLs (reaching nearly 20 times the MCL in the shallow

zone). These monitoring results confirm that natural attenuation alone is not sufficient to meet the Remedial Action Objective (RAO) for the Whittier Narrows OU and prevent the migration of contaminants into the Central Basin in excess of drinking water standards.

Allegheny Teledyne Comment No. 2. *In the FS Addendum, EPA compared only two alternatives: No Action and the proposed pump and treat system. EPA's failure to adequately consider other possible remedies has resulted in an inadequate and incomplete analysis of alternatives.*

EPA's Response. In 1993, EPA issued a "Monitoring Only" ROD for the Whittier Narrows OU. The decision to monitor groundwater contamination and not to pursue other actions was based on groundwater data that showed low and stable concentrations of contaminants, generally below MCLs. The FS Addendum was prepared in response to rising contaminant concentrations in the western portion of Whittier Narrows, when it became apparent that monitoring only would not be a sufficient response. The remedial action alternative developed in the FS Addendum is considered by EPA to be the only response action that could meet the Remedial Action Objective for the Whittier Narrows OU of controlling contaminant migration into the Central Basin. None of the stakeholders involved in the alternatives development process suggested other alternatives that might have met the Remedial Action Objective.

It should be noted that, as is described in the FS Addendum and this ROD Amendment, EPA intends to implement the remedy in a very flexible manner. Only those areas near the Dam with confirmed drinking water standards exceedances at any given time will be targeted for containment.

Allegheny Teledyne Comment No. 3. *The FS Addendum does not include results of model runs with the proposed remedy in place. Therefore, there is no way to compare the effects of the proposed remedy to the "no action" scenario. CH2M Hill previously made model runs, not included in the final FS Addendum, with the simulated proposed remedy in place. Those model runs showed that the effect of the proposed remedy was to reduce the concentration of PCE downgradient of the Whittier Narrows Dam by only a few parts per billion. Given the many uncertainties in aquifer characteristics, recharge, precipitation, pumping and other factors, in addition to the flaws in the model pointed out by several commenters, a difference of a few parts per billion in model runs is not a sufficient basis for the $20 million + proposed remedy. EPA has apparently recognized this and has decided not to rely on the modeling. Instead, EPA says that it is relying on observational data. However, the recent observational data discussed in 1 above do not support the agency's conclusion.*

EPA's Response. This comment incorrectly states that the FS Addendum does not include the results of model runs with the proposed remedy in place. Figures are included in the FS Addendum that show projected groundwater particle tracks with the remedy operational. These modeling results were then used to estimate costs for the various components of the remedial alternatives. These model runs clearly show the projected hydraulic control of the contaminated areas with the remedy operational.

The model results referenced in the comment are preliminary contaminant transport modeling results generated from a generalized, uncalibrated contaminant transport model. As EPA states in Section 5 of the FS Addendum: "Because the remedial action objective for the Whittier Narrows OU focuses on containment (i.e., hydraulic control) and not on cleanup of the aquifer, contaminant transport simulations were not used as part of the evaluation to identify

appropriate extraction rates. The contaminant transport simulations presented in Section 8 for the no-additional-action alternative are only intended to provide gross approximations of potential contaminant migration. No attempt was made to calibrate the computer model for contaminant transport to observed conditions. The simplified contaminant transport simulations are too general to be useful in identifying appropriate extraction rates for containment."

As noted above in the response to Comment No. 1, EPA believes that the results of recent field activities confirm the need to act to control migration of contamination (in excess of drinking water standards) into the Central Basin.

Allegheny Teledyne Comment No. 4. *We have asked PES to re-submit comments on the draft FS Addendum stated its May 21, 1998 letter to EPA. That comment letter pointed out that CH2M Hill's contaminant transport modeling is unreliable, that the CH2M Hill design for the hydraulic barrier does not account for expected reductions in groundwater extraction rates, and that CH2M Hill may have vastly underestimated the cost of the hydraulic barrier plan.*

EPA's Response. Specific responses to the issues touched on in this comment are included below in the response to the referenced PES Environmental comments.

Allegheny Teledyne Concluding Comment. *In summary, EPA does not currently have a sufficient basis for the selection of the remedy it has chosen. Additional information needs to be collected, and further studies should be completed before a remedy is selected.*

EPA's Response. EPA strongly disagrees with this comment. Considerable groundwater quality and groundwater flow data have been collected in the Whittier Narrows area. These data clearly demonstrate that contaminants above MCLs are migrating through Whittier Narrows towards and into the Montebello Forebay portion of the Central Basin. The only way to ensure that the objectives for this OU are met in a timely, cost-effective manner is to implement a groundwater containment remedy soon. The selected remedy will be implemented in a flexible, phased approach that will address containment of only those portions of the aquifer where the data indicate migration of groundwater that exceeds drinking water standards towards Montebello Forebay.

1.2 Responses to Comments from Baker and McKenzie

Baker and McKenzie Comment No. 1. *Need to Consider Additional Alternatives.*

The Addendum basically considers two alternatives: (1) "No Additional Action" (required by law); and (2) several variations on "Groundwater Containment Near Whittier Narrows Dam." Both alternatives require further comment and clarification.

The No Additional Action alternative assumes, among other things, that "No remedial measures would be taken to control the migration of contaminated groundwater from the San Gabriel Basin to the Central Basin." (Addendum at 8-2) In reality, there are many ongoing institutional controls that will remain in effect in the future to control the migration of contaminated groundwater. These include, among others, ongoing regulatory controls and enforcement by the California Regional Water Quality Control Board, Los Angeles region, San Gabriel Basin Watery Quality Authority projects to assist local communities to investigate and remediate contaminated groundwater, wellhead pump and treat programs by water

purveyors and voluntary actions by generators to remediate not only contaminated soils but in some cases groundwater under their facilities.

In short, the law may require that EPA consider a No Additional Action alternative. However, it would be more realistic to also consider a "status quo" alternative which accounts for ongoing remedial efforts and programs.

EPA's Response. There are no ongoing long-term remedial efforts that control the migration of contaminated water from the San Gabriel Basin, through Whittier Narrows and into the Central Basin. There is one limited extraction and treatment project in Whittier Narrows currently under construction by the San Gabriel Basin Water Quality Authority that is expected to reduce contamination in the shallow zone for a period of up to two years. Some of the remedial measures in upgradient areas mentioned can have an affect on the volume of additional contamination that will enter the Whittier Narrows area in the future and the length of time the remedy will need to operate. This may affect the size or duration of the remedy over the long-term, but not the need for the remedy.

Wellhead pump and treat programs by water purveyors serve only to reduce the likelihood of exposure to the groundwater contamination, but do nothing to control the continued migration of contamination.

Consideration of a "status quo" alternative would not have aided the Feasibility Study given the evidence of ongoing contaminant migration in excess of drinking water standards and the lack of existing actions to address this contaminant migration.

Baker and McKenzie Comment No. 2. *EPA's Containment alternative addresses relevant issues, but does not appear to fully account for the relationship between the Whittier Narrows Operable Unit ("WNOU") and the South El Monte Operable Unit ("SEMOU"). Specifically, the Addendum and EPA's proposed remedial alternative seems to treat the WNOU independent of ongoing remedial activities in the SEMOU; activities that will likely result in significant reductions in the cost of EPA's proposed WNOU remedy. For example, the proposed SEMOU shallow barrier pilot project (SEPP") appears likely to proceed at this juncture. Proponents of the SEPP expect to obtain the last permit necessary for operation of the project during the January 25, 1999 Regional Water Quality Control Board meeting. The remaining portions of the SEPP can likely be constructed and operation can begin within the following sixty days. Furthermore, EPA is aware that conservative groundwater modeling performed by proponents of the SEPP indicates that the SEPP should effectively reduce significant levels of shallow zone contaminants in the SEMOU before they ever reach the WNOU.*

The Addendum would be strengthened if it recognized the likelihood that the SEPP will be operating in the next few months as well as the "most likely" projections for contaminant removal. The SEPP is likely to reduce threats to human health and the environment in both the SEMOU and the WNOU (a threshold criteria). Furthermore, the SEPP offers the greatest short term effectiveness in reducing toxicity mobility and volume through cost-effective treatment (all primary balancing criteria). In conclusion, we recommend either supplementing the Containment option or adding a third option which addresses what remedial actions would be required in the WNOU if the SEPP was part of a long-term remedy.

We acknowledge that EPA makes some attempts at offering a flexible remedy: " . . . EPA intends to consider a variety of implementation options during remedial design that result in the most cost-effective remedy implementation." (Addendum at 8-2) At present, the SEPP appears to be the most cost-effective component of a coordinated remedy between the SEMOU and the WNOU. Consequently, we recommend EPA address the SEPP more directly in a final WNOU remedy.

EPA's Response. It is EPA's understanding that the SEPP is intended to operate as a short-term pilot project. EPA concurs that the SEPP can potentially provide cost-effective removal of contaminant mass in the South El Monte OU area. However, the SEPP will not affect the need for containment in Whittier Narrows to address contaminant migration into the Central Basin. Also, because the SEPP is only focused on a portion of the contamination in South El Monte OU, it will not significantly affect the overall width of the extraction zone needed to achieve containment in Whittier Narrows for many years. If reductions in contaminant concentrations occur as a result of the SEPP in South El Monte, EPA will adjust operation of Whittier Narrows extraction wells accordingly to minimize costs.

Baker and McKenzie Comment No. 3. *Other remedial activities are planned which should also reduce the amount of contaminants and size of the plume potentially impacting the WNOU. For example, I understand that both the City of Monterey Park and the San Gabriel Valley Water Company will be constructing well head treatment systems and resume pumping on wells which previously drew water away from the WNOU. These actions should be accounted for in a final remedy, as they will reduce the amount of contaminants flowing towards and potentially through the WNOU.*

EPA's Response. The wellhead treatment systems referred to in this comment are currently being contemplated as a significant component of the remedy for the South El Monte OU. EPA does not expect these wellhead treatment actions to have any substantive affect on long-term operation of the Whittier Narrows remedy. These actions will capture water flowing to the west and not towards Whittier Narrows. Also, the pumping rates anticipated at these wells will not be significantly above historical rates.

Baker and McKenzie Comment No. 4. *Recognize Complex Hydrogeology and Limitations of CFEST Model.*

Well borings recently drilled by EPA (Wells EPA W4-18, -19 and -20) at the downstream toe of the Whittier Narrows Dam all encountered bedrock at unexpectedly shallow depths. Accordingly, the cross-sectional area available for subsurface flow is much smaller than previously believed. This major discovery at this relatively late state in the RI/FS process shows how imperfectly all stakeholders understand a very complex depositional environment.

The above finding resulted in major recalibration of the Coupled Fluid, Energy and Solute Transport ("CFEST") model used by EPA for the WNOU. As I understand it, major changes in assumptions for critical input parameters such as horizontal conductivity, hydraulic conductivity, the ratio between vertical and horizontal conductivity and the recharge of precipitation and surface water had to be made to calibrate the model subsequent to this finding. I am concerned that the current values in the input parameters could be more closely related to a desire to simply calibrate the model (as opposed to changes based on actual physical data). This is problematic, as it increases the likelihood that the proposed remedy could be challenged later – an event no one wants to happen.

In summary, the Addendum (and EPA's proposal for remediation) would be less susceptible to a future challenge if it was based on a more widely accepted groundwater model that all stakeholders could analyze and support. There are many public and proprietary models available which are arguably superior to the CFEST model used for the WNOU. Without endorsing any model in particular. I offer the Mod-flow model as one potential alternative that is more likely to obtain a consensus approval from stakeholders.

EPA's Response. There are many aspects of the hydrogeology of the Whittier Narrows area that have not been well-characterized. Bedrock was encountered at a depth of between 300 and 400 feet while installing wells near Whittier Narrows Dam. Previously the bedrock was

assumed to begin about 800 feet below ground surface. Since nearly all of the contamination in Whittier Narrows lies above 350 feet, the discovery of bedrock at shallower-than-expected depths will not affect the need for a remedy in Whittier Narrows.

EPA's selection of a remedy for the Whittier Narrows OU is not based on the results of computer modeling. The need for action is based on the contaminant data observed in the field and measurements of physical parameters indicating groundwater flow directions and gradients. While our understanding of all of the parameters is not perfect, we have enough of an understanding to determine that continued uncontrolled migration of contaminated groundwater poses a threat to the Central Basin. The modeling is used to help estimate costs for a remedy and to illustrate the general magnitude of remedy components potentially required to meet EPA's remedial objectives.

The model input parameters used for the Whittier Narrows model are based, to the extent practicable, on actual physical data gathered from field investigation. None of the input parameters were selected simply to achieve calibration without regard to the available data on conditions in the area.

Baker and McKenzie Comment No. 5. *Recognition of a "Dynamic Plume"*

As more fully described below, a technical basis exists for a proposition that the contaminant plumes at issue are more dynamic than earlier thought, waxing and waning with changes in rainfall, etc. Based on this assumption, the Addendum should be supplemented to address the potential that EPA's current remedy may be addressing a probably short-lived scenario. Consequently, the proposed remedy may be more conservative than is warranted (especially in light of likely remedial actions in the SEMOU).

When viewed over time, the contaminant plumes of concern appear to change relatively quickly in response to water supply conditions (precipitation, recharge, etc.) and extraction variations. For example, above MCL concentrations of certain contaminants of concern were present in the WNOU in the early 1980's. These concentration levels declined and generally remained below MCLs during the "drought" years of the late 1980's and early 1990's. Ground water levels in the shallow aquifer during the drought also fell by about 20 feet or so, depending upon locations.

In the early to mid-1990's, the area experienced above average precipitation. Ground water levels began to rise and the dissolved VOC concentrations again began to advance towards the WNOU. This fluctuation in groundwater levels appears to be part of an ongoing trend. However, the fact that we are dealing with groundwater levels from above average precipitation leads one to believe that the current advancement of the plume is also "above average."

Any "long term" remedy must account for the fluctuations in contaminant migration over the long term. We are concerned that the current remedy may only be looking at a worst case scenario and will not be cost effective over time. A more measured response that gives remedial action in the SEMOU time to work would appear t be a viable and more appropriate alternative.

EPA's Response. EPA does not believe that there are sufficient data to support the conclusion that the current movement of contamination in western Whittier Narrows is "above average". However, EPA's selected remedy is intended to be flexible such that changes (either short-term or long-term) in the size of the contaminated area requiring containment can be accounted for in remedy operations. EPA intends to operate the remedial extraction wells to provide only the necessary pumping at each depth interval (shallow and intermediate) to contain the overall

width of contamination above MCLs in that specific interval at that time. This will ensure that the long-term costs of operating the remedy are minimized.

The comment describes historical changes in contaminant concentrations in Whittier Narrows between the early and late 1980s. However, it should be noted that no wells existed in western Whittier Narrows (the focus of the selected remedy) until 1989. Many of the wells in western Whittier Narrows and South El Monte have only been in operation for a couple of years so there is not enough data to assess long-term trends. But, the overall size (width and depth) and magnitude of contamination already present in Whittier Narrows indicates that there will be a considerable area of contamination requiring containment. Containment will be needed regardless of other physical factors that may affect the addition of more contaminant mass to the aquifer and the speed of contaminant migration.

1.3 Responses to Comments from PES Environmental, Inc. (December 29, 1998)

PES Environmental Dec. 1998 Comment No. 1. ***Recent Data Do Not Show That Higher Than MCL Concentrations Are Entering the Central Basin Aquifers***

There are significant deficiencies with the contaminant transport analysis presented in the final WNOUFS. The unanswered question in the final WNOUFS is -- how do natural attenuation mechanisms (such as diffusion, dispersion, sorption, biodegradation, etc.) affect contaminant concentrations and migration rates in the Whittier Narrows Area? Without an answer to this fundamental question, USEPA has no basis for proposing construction of a hydraulic barrier in Whittier Narrows.

USEPA states on page 3 of the October 1998 response letter that:

> *"EPA's proposal to proceed with implementation of a pump and treat extraction barrier is based primarily on observational data rather than model data. Groundwater and flow data from near Whittier Narrows Dam indicate that significant groundwater contamination will be entering the Central Basin aquifer very soon."*

Indeed, additional observational data have been collected since the draft WNOUFS was released to help assess the appropriateness of constructing a hydraulic barrier. August 1998 data for USEPA groundwater monitoring wells (i.e., EPA W4-18, W4-19, and W4-20), installed just south of Whittier Narrows Dam indicate that concentrations of chemicals of potential concern are below MCLs. These observational data appear to conflict with the stated basis of USEPA's position that observational data are controlling decisions regarding the need for remedial action in the Whittier Narrows area and highlight the general lack of USEPA's understanding of contaminant transport in the Whittier Narrows area.

Based on these recent findings and the lack of any reliable contaminant transport analysis, it would be prudent to obtain a better understanding of the lateral and vertical extent of contaminants in areas identified for groundwater extraction. USEPA should consider collecting additional information to better evaluate the need for and, if necessary, to optimize the design of any groundwater extraction system.

EPA's Response. The comment claims that additional understanding of natural attenuation mechanisms in Whittier Narrows is necessary before a hydraulic barrier can be proposed. EPA

disagrees with this assertion. The need for a hydraulic barrier is demonstrated by the presence of contaminants well in excess of drinking water standards migrating towards the Central Basin. Current and historical observations of drinking water standard exceedances south of the Whittier Narrows Dam demonstrate that this contamination migrates into the Central Basin.

The comment notes that the new monitoring wells installed by EPA south of the dam in 1998 do not exceed drinking water standards and implies that this affects the need for a hydraulic barrier. EPA's intent for this remedy is to halt migration of contamination above drinking water standards into the Central Basin. EPA does not believe it is necessary or appropriate to wait until significant contamination has already entered the Central Basin to make a decision that hydraulic control is warranted.

EPA does agree that collection of additional data on the lateral and vertical extent of contamination is warranted to assist with remedial design and to ensure that any extraction barrier installed can be operated as efficiently as possible. In August 1999, EPA completed installation of additional extraction and monitoring wells in the Whittier Narrows area to provide pre-remedial design data.

PES Environmental Dec. 1998 Comment No. 2. *The Contaminant Transport Analysis is Flawed*

In response to the numerous comments received regarding the use of the CFEST groundwater transport model to simulate contaminant migration, USEPA states on page 2 of the October 1998 response letter that the computerized contaminant transport analysis is:

> *"a general indicator of what might happen to contaminant levels in the Central Basin if no action is taken by EPA".*

USEPA further explains on page 2 that:

> *"because there has been no attempt to calibrate the model to observed contaminant movement, conclusions regarding eventual contaminant concentrations are only valid in the most general sense."*

Notwithstanding these USEPA comments, CH_2M Hill continues to assert that one of the general indications from the contaminant transport analysis is that:

> *"under the no-action scenario, contamination in excess of MCLs is likely to occur over a fairly broad area in the Montebello Forebay portion of the Central Basin" (CH_2M Hill October 1998 report; p. A-20).*

This finding, in part, is based on a groundwater flow model that is purportedly calibrated. However, computer calculated head differences between the shallow and intermediate zones are only 8.5 feet (actual, observed head differences are on the order of 25 feet). Further, computer calculated water level elevations differ from measured water level elevations by 20 feet or more at several calibration wells. As a consequence, the contaminant transport model allows for horizontal groundwater flowpaths different than observed, as well as for greater vertical migration of contaminants between the shallow and intermediate zones than actually occurs.

In addition, although numerous parties disagreed with the model representation of potential contaminant sources in the South El Monte Operable Unit as infinite contaminant sources, CH_2M Hill continues to simulate these potential sources as "held concentration nodes." On page A-17, CH_2M Hill states that:

> *"to approximate the likely presence of continuing sources of VOC contamination to the groundwater aquifer under the no-action scenario, selected nodal concentrations in the vicinity of contaminant sources in the South El Monte OU were held constant throughout the 17.75-year simulation period. Given the uncertainty regarding sources, holding concentrations constant is a reasonable, if somewhat conservative, approach."*

In essence, holding concentrations constant at model nodes in the South El Monte Operable Unit prevents simulated natural attenuation processes from acting on potential contaminant sources. This unrealistic approach in representing potential contaminant sources predetermines CH_2M Hill's model finding that higher than MCL concentrations will migrate downgradient of Whittier Narrow Dam.

In conclusion, the analysis in the final WNOUFS does not adequately address contaminant transport issues in the Whittier Narrows area and does not support the finding that contaminants at levels above MCLs will migrate over a fairly broad area in a portion of the Central Basin if a hydraulic barrier is not constructed. Further, additional groundwater information is necessary in the areas proposed for groundwater extraction to allow for better characterization of subsurface conditions and, if necessary, optimization of any groundwater extraction system.

EPA's Response. As has been the case periodically over the last several years, contaminant concentrations in the Central Basin south of the Whittier Narrows Dam currently are at or just above drinking water standards in isolated intervals and locations. This supports EPA's conclusion that groundwater contamination in Whittier Narrows migrates downgradient into the Central Basin in excess of drinking water standards. Further, the contaminant concentrations detected at monitoring wells in Whittier Narrows are much higher now than they were just a few years ago. This supports the conclusion that, without containment, higher concentrations can be expected in the Central Basin in the future.

These conclusions are based on observations of groundwater flow conditions and contaminant concentrations measured in the field and do not rely on contaminant transport simulations.

The representation of source areas in the South El Monte OU as held concentration nodes in the no-action scenario contaminant transport model simulations was made as a conservative simplifying assumption. In reality, the model may be either underestimating or overestimating the magnitude of contaminant sources in the South El Monte OU. Concentrations measured in the field at some monitoring wells (e.g., MW4-15) in Whittier Narrows already exceed the levels that the contaminant transport model predicts in another 18 years. This implies that the contaminant transport model may be underestimating the magnitude of the South El Monte OU sources.

The commentor does not believe that EPA has adequately supported the statement that contaminants in excess of MCLs will migrate over a fairly broad area of the Central Basin if a hydraulic barrier is not constructed. It should be noted that, regardless of the ultimate size of the contaminated area in the Central Basin, the continued migration of groundwater contamination in excess of MCLs through Whittier Narrows and into the Central Basin would not meet the Remedial Action Objective of the WNOU.

1.4 Responses to Comments from PES Environmental, Inc. (May 1998)

PES Environmental May 1998 Comment No. 1. ***CH_2M Hill's Contaminant Transport Modeling Is Unreliable.***

CH_2M Hill contends on page 4-1, that: "[T]he "base case" particle tracking simulation presented in Section 5 and the no-action alternative contaminant transport simulations presented in Section 8 confirm that, without a hydraulic barrier that includes new groundwater extraction, widespread contaminant migration into the Central Basin will occur at levels in excess of MCLs."

First, although the particle tracking simulations performed by CH_2M Hill indicate that groundwater flows from Whittier Narrows into the Central Basin, they do not indicate that contaminant migration will occur into the Central Basin at levels in excess of MCLs. Because volatile organic compounds (VOCs) dissolved in groundwater migrate at rates less than that of groundwater itself, the particle tracking simulations performed by CH_2M Hill simply show the estimated extent of groundwater migration but do not represent the extent of contaminant migration.

Second, in order to assess contaminant migration in the Central Basin, CH_2M Hill constructed a contaminant transport model "...to provide a simplistic, generalized evaluation of potential future groundwater concentrations in the Central Basin..." (page A-31). Further, CH_2M Hill states on page A-32:

> *"Because this contaminant transport modeling was only intended to provide a general indication of potential conditions in the Central Basin under the no-action scenario, no attempt was made to calibrate the transport model. Calibrating the model to generate initial concentrations that match observed concentrations is a very time-consuming process. To do so accurately requires a detailed history of the sources of contaminants, including locations of releases, volumes of releases, and timing of releases."*

The contaminant transport model constructed by CH_2M Hill is an admittedly very crude tool that is not likely to provide accurate estimates of the contaminant levels in the Central Basin and certainly does not support CH_2M Hill's finding that "widespread contaminant migration into the Central Basin will occur at levels in excess of MCLs". Because CH_2M Hill's contaminant transport analysis is one of the key findings driving the need for an hydraulic barrier in Whittier Narrows, it would be appropriate, prior to the expenditure of tens of millions of dollars for construction and operation of such barrier, that additional contaminant transport analyses be performed to better define contaminant migration into the Central Basin.

Other contaminant transport modeling issues that need to be addressed to provide a more accurate prediction of future conditions include: (1) the similarity in size of simulated contaminant plumes in both the upper and lower aquifers despite a six-fold difference in hydraulic conductivity for the two aquifers; (2) use of constant concentration nodes in the model without supporting evidence of the existence of constant contaminant sources; (3) ignoring fraction of organic carbon data that would result in greater retardation values and reduction in simulated tetrachloroethylene (PCE) migration rates; (4) exclusion of sorption processes in the simulation of PCE migration that results in an increase in contaminant migration rates; and (5) the lack of any model calibration that provides information as to the accuracy of the model results.

EPA's Response. The comment incorrectly asserts that the "contaminant transport analysis is one of the key findings driving the need for a hydraulic barrier in Whittier Narrows." Contaminant transport modeling is included in the FS Addendum only as a general indicator of what might happen to contaminant levels in the Central Basin if EPA takes no action. Because there are little data available on the quantity of contaminants present in upgradient source areas and because there has been no attempt to calibrate a contaminant transport model to observed contaminant movement, conclusions regarding eventual contaminant concentrations are only valid in the most general sense. EPA does not believe that expending additional effort on contaminant transport modeling is appropriate given the containment objectives of this remedy and the lack of available data on the magnitude and distribution of the contaminant sources.

EPA's proposal to proceed with a pump and treat extraction barrier is based primarily on observational rather than model data. Groundwater flow and quality data from near Whittier Narrows Dam indicate that significant groundwater contamination will be entering the Central Basin aquifer very soon. PCE contamination ranging from 7 to 12 µg/L has been found in the shallow zone at EPA well MP-1 located approximately 1/4 mile north of Whittier Narrows Dam. Concentrations of PCE ranging from 39 to 92 µg/L have been found in the shallow zone at EPA well 2-5, located about 1/4 mile north of the dam. In EPA's well MW4-15, located about one mile north of the Dam, shallow concentrations of PCE have recently varied between 245 and 310 µg/L. Concentrations in the shallow zone have increased dramatically in these wells over the last few years. Sharply increasing concentrations of PCE north of the Dam coupled with the rapid movement of shallow groundwater towards the Central Basin provides adequate justification for the rapid implementation of EPA's containment remedy.

PES Environmental May 1998 Comment No. 2a. ***CH_2M Hill's Design of the Hydraulic Barrier Does Not Account For Expected Reductions in Groundwater Extraction Rates***

The design of the hydraulic barrier in Whittier Narrows proposed by CH_2M Hill includes groundwater extraction wells located perpendicular to the groundwater flow direction and pumping 10,000 gallons per minute (gpm). Based on particle tracking simulations, CH_2M Hill concludes that this configuration of extraction wells will contain contaminants migrating into Whittier Narrows. CH_2M Hill understands, however, that the future extraction rate for the Whittier Narrows' groundwater extraction wells will likely decrease once remedial actions are implemented upgradient of Whittier Narrows. For example, CH_2M Hill states on page 1-3:

> *"[I]mplementation of containment measures intended to inhibit the flow of contamination from the South El Monte OU into Whittier Narrows could significantly reduce the long-term operations cost of the Whittier Narrows OU remedy."*

and on page 5-12:

> *"... over the 30-year period considered for estimating costs, it is expected that flow rate needed for containment will drop as remediation progresses and the influx of contaminants into the aquifer continues to decline."*

Given CH_2M Hill's understanding of future reductions in groundwater pumping for remediation purposes in Whittier Narrows, it is surprising that additional particle tracking simulations using lower groundwater extraction rates were not performed. Because of the perpendicular configuration of the proposed groundwater extraction wells (as opposed to a parallel configuration), reductions in

groundwater extraction rates may lead to breakthrough of contaminants between the proposed extraction wells. A parallel configuration may allow for more flexibility in any groundwater extraction system. Prior to considering any groundwater extraction option from Whittier Narrows, it is recommended that CH_2M Hill revisit the orientation of the proposed groundwater-extraction wells in Whittier Narrows and/or perform additional simulation to assess the effect of reduced extraction rates on contaminant breakthrough.

EPA's Response. The conceptual layout of remedy components presented in the FS Addendum was prepared to derive cost estimates and provide a preliminary indication of the effectiveness of the proposed remedy. Additional configurations of the remedy components will be evaluated during remedial design. EPA intends for the remedy to be implemented in a fashion that allows for flexibility in long-term remedy operations. Groundwater extraction rates will be limited to the lowest rates necessary to contain the contaminated area at any given time.

The comment questions why additional simulations were not performed at lower extraction rates. EPA did perform numerous simulations at lower rates. The 8,750 gpm flow rate presented in the final FS Addendum is the lowest flow rate simulated that provided full containment of the upgradient contamination currently present in South El Monte.

Although EPA does expect that the size of the contaminated area needing to be contained will shrink over the long-term (decades), there is no way to predict the manner in which this will occur. To perform additional simulations that evaluate reduced flow rates, EPA would need to speculate on the future configuration of the contaminated area. Rather than attempting to guess how the extent of contamination may change over time, EPA's cost estimates presented in the FS Addendum simply assume that long-term average extraction rates (7,500 gpm) will be lower than the peak of 8,750 gpm predicted for containing the current extent of upgradient contamination. Using a lower average flow rate for costing results in lower operations and maintenance cost estimates.

Regarding extraction well configuration, additional evaluations of well configuration will be performed during remedial design. However, it should be noted that the parallel configuration recommended by the commentor is more suited for a single plume of contamination originating from a single source. In that instance, the concentrations will always be highest along the centerline and lower at the edges. Over time as the size of the plume shrinks, the overall width of contamination will get smaller and smaller. However, in Whittier Narrows the area of contamination to be contained consists of numerous commingled contaminant plumes coming from many sources located across a fairly broad area in South El Monte. Given these conditions, there is no centerline of contamination along which extraction wells could be situated in parallel configuration.

EPA expects that, initially, a row of wells placed across the leading edge of contamination and perpendicular to the direction of groundwater flow will be the most efficient way to provide the required containment. Depending on how the overall width of the contaminated area changes over time, additional extraction wells may be needed to allow EPA to continue to provide full containment while minimizing the extraction rate.

PES Environmental May 1998 Comment No. 2b. *In addition, CH_2M Hill states on page 1-3:*

"... until the remedy selection process in South El Monte progresses further, it is impossible to estimate the impact of any South El Monte remedy on the operations of a remedial action in Whittier Narrows."

Given the potentially significant effect of planned groundwater remediation efforts in upgradient OUs on contaminant levels in Whittier Narrows, any analysis of groundwater remedial options for Whittier Narrows that does not consider these planned upgradient efforts will result in an overly conservative assessment of remediation requirements for the Whittier Narrows OU. Moreover, we disagree with CH_2M Hill's statement that it is impossible to estimate these effects. Clearly, the numerical groundwater flow model used by CH_2M Hill to estimate the impact of remedial actions in Whittier Narrows could be modified to assess the effect of these upgradient remedial actions on contaminant levels in Whittier Narrows. Possible implications of such an assessment include changes to: (a) location of groundwater extraction wells; (b) capacity of treatment facilities; and (c) treated water reuse options.

CH2M Hill should take into account the South El Monte remedy prior to recommending a remedy for Whittier Narrows.

EPA's Response. EPA agrees that implementation of aggressive remedial actions in the upgradient South El Monte OU could reduce the time frame required for overall remediation in Whittier Narrows or reduce the magnitude of extraction required in Whittier Narrows in the future, resulting in reduced long-term costs. However, there are no scenarios where actions in the South El Monte OU would eliminate the need for some type of hydraulic barrier in Whittier Narrows to control migration into the Central Basin. EPA's preferred remedial alternative for the South El Monte OU does not include long-term containment actions in the southern portion of the South El Monte OU. The relationship between the Whittier Narrows remedy and remedial actions in the South El Monte OU was considered and evaluated in the South El Monte OU FS Report.

Any impacts of the remedy selected for the South El Monte OU on the Whittier Narrows OU remedy will be considered during remedial design. It is not expected that any actions in the South El Monte OU would affect the configuration of the Whittier Narrows remedy for at least the initial 5 to 10 years of operation, if not longer.

PES Environmental May 1998 Comment No. 3. ***Other Issues***

It is important to note that contamination found in Whittier Narrows may not only originate from the South El Monte Operable Unit (OU) but from further upgradient OUs such as the El Monte OU. For example, CH_2M Hill states on page 1-3: "[G]roundwater flow directions and the distribution of contamination in the area suggest that the majority of the contamination present in the western portion of Whittier Narrows either emanates from the South El Monte OU or flows through South El Monte and into Whittier Narrows."

EPA's Response. Based on available groundwater monitoring data from the South El Monte and El Monte OUs, it appears as though nearly all of the contamination affecting western Whittier Narrows originates within the South El Monte OU. Regardless, the origination of upgradient contamination migrating into western Whittier Narrows does not affect the need for or configuration of a containment remedy in Whittier Narrows.

PES Environmental May 1998 Comment No. 4. *CH_2M Hill fails to present the cost of extracting groundwater from Whittier Narrows should the purchase of replenishment water be required. Quite simply, the cost for extracting 10,000 gallons per minute for a period of one year is approximately $4*

million. Accordingly, the cost for purchasing replenishment water over the 30-year project lifetime exceeds the total cost of $16 million for the proposed hydraulic barrier plan. Given the enormity of this expense, it would be prudent to establish favorable groundwater reuse arrangements prior to constructing the hydraulic barrier project.

EPA's Response. Table 2-2 does discuss the per acre-foot charges for replacement or replenishment water that could be incurred if necessary agreements could not be reached with water purveyors and water management agencies. It is EPA's intent to work out an appropriate end use scenario for the Whittier Narrows remedy that does not require EPA to pay replacement costs for the extracted water.

1.5 Responses to Comments from the Southeast Water Coalition (SEWC)

SEWC Comment No. 1 *EPA needs to provide a contingency action plan that will treat wells in the Central Basin that may become affected by San Gabriel Valley contamination in the future.*

EPA's Response. EPA has not included a wellhead treatment contingency in this ROD Amendment. Historically, EPA has not provided wellhead treatment to affected water producers in the San Gabriel Basin. EPA will continue to apply Agency resources towards the task of protecting the quality of the groundwater aquifer by containing contaminant source areas and capturing contamination in the aquifer.

Once the selected remedy is implemented, EPA considers it unlikely that any additional Central Basin production wells will require wellhead treatment. The remedy should stop migration of contamination through the Narrows, thereby reducing the threat of significant contamination reaching the Central Basin.

However EPA expects that some of the contamination currently in the Narrows will continue to move into the Central Basin aquifer before the proposed remedy can take effect. EPA installed three additional multiport monitoring wells immediately south of Whittier Narrows Dam to better assess the quality of groundwater entering the Central Basin. EPA will continue to monitor all of the wells along the Dam to detect any changes in contaminant levels. Should contaminant levels increase such that groundwater contamination poses a significant threat to Central Basin production wells, EPA may implement a focused, fast-track temporary extraction system to protect Central Basin wells.

SEWC Comment No. 2 *SEWC requests that the USEPA continue its current momentum to final implementation of remedial action in the Whittier Narrows as proposed in the WNOUFS Addendum and as communicated at the Joint Technical Meetings of the Whittier Narrows and South El Monte Operable Units and to the SEWC Policy Board.*

EPA's Response. Comment noted. EPA agrees that timely implementation of the selected remedy in Whittier Narrows is critical. During preparation of this ROD Amendment, EPA has continued to work with local stakeholders and the State of California to move towards getting the necessary agreements in place to allow the selected remedy to be implemented as quickly as possible. Throughout the process, EPA will look for opportunities to accelerate implementation of the Whittier Narrows remedy. In addition, EPA will continue to monitor groundwater

conditions at the Whittier Narrows Dam to provide early warning of increasing impacts to the Central Basin that may warrant additional consideration.

SEWC Comment No. 3. *SEWC strongly urges the USEPA to continue working towards implementation of remediation in the Whittier Narrows as stated in meetings and in the WNOUFS Addendum, regardless of activities proposed by the El Monte/South El Monte Operable Units and/or the association South El Monte Operable Unite Participants (SEMOUPs). Remediation of this contamination will be required regardless of what occurs in the South El Monte Operable Unit. If remediation in the South El Monte Operable Unit could begin today, the Central Basin would still face the migration of contamination that currently exists downstream of those remedial activities. The USEPA must move forward by constructing what is required in the Whittier Narrows to capture and remove the contamination that is currently migrating toward and through the Narrows.*

EPA's Response. Comment noted. EPA agrees that a remedy will be required in Whittier Narrows regardless of any action taken in upgradient areas. EPA will construct the Whittier Narrows remedy so that contamination existing downgradient of the South El Monte OU will be addressed.

SEWC Comment No. 4. *SEWC supports the early removal of shallow zone contamination from the Whittier Narrows area near San Gabriel Boulevard, as recently proposed by the SEMOUPs and the San Gabriel Basin Water Quality Authority, if such a project does not delay the progress of the WNOU remediation as proposed.*

EPA's Response. Comment noted. EPA believes that accelerated implementation of shallow zone containment for the area of highest contaminant concentrations (near the intersection of San Gabriel and Rosemead Boulevards) in Whittier Narrows would be very beneficial to the remedial efforts in the Whittier Narrows OU. EPA continues to support the San Gabriel Basin Water Quality Authority's early implementation of a shallow zone containment system at this location.

SEWC Comment No. 5. *SEWC will not accept any remedial activities that are designed to allow any additional contamination exceeding the maximum contaminant levels to enter the Central Basin from the San Gabriel Valley. SEWC has not only production wells to be concerned about, but a forebay into the entire Central groundwater basin is at potential risk. Migration of San Gabriel Valley contamination into the Montebello Forebay could have a devastating impact on the entire groundwater basin.*

EPA's Response. Comment noted. EPA shares SEWCs concerns regarding the threat to the groundwater resources of the Central Basin. As described in Part II of this ROD Amendment, groundwater containment will be required in portions of the Whittier Narrows OU where groundwater contaminated with chemicals in excess of the chemical-specific ARARs (drinking water standards or MCLs) is migrating through Whittier Narrows towards the Montebello Forebay. This objective is expected to provide the necessary protection to the Central Basin groundwater resource.

SEWC Comment No. 6. *Any delay in implementing removal in the Whittier Narrows allows more contamination to migrate into the Central Basin. This situation has been studied by the USEPA since the late 1980s and it is now time for action.*

EPA's Response. Comment noted. As described above in the response to SEWC's comment No. 2, EPA agrees that rapid implementation of the Whittier Narrows remedy is critical. EPA intends to accelerate implementation of the Whittier Narrows remedy as much as possible.

1.6 Responses to Comments from the Water Replenishment District of Southern California (WRD)

WRD Comment No. 1. *The Remedial Action Objective (RAO) for the Whittier Narrows was developed cooperatively between EPA and the Whittier Narrows Local Agency Workgroup. The Whittier Narrow RAO is to protect groundwater resources in the Montebello Forebay portion of the Central Basin from VOC contamination emanating from the San Gabriel Valley. To the extent technically and economically feasible. EPA intends to control migration in the San Gabriel Valley so that groundwater from the Whittier Narrows and Montebello Forebay production wells not exceed MCLs. Under the current Superfund process, the State of California will assume operational liability for any remedial facilities after ten years. Up to and beyond that time, if concentrations are encountered that exceed the treatment capabilities of facilities that may be constructed, what will the EPA provide as assurance that the current Whittier Narrows RAO be maintained?*

EPA's Response. The objectives for the remedy described in this ROD Amendment require extraction in all areas where groundwater contaminated above drinking water standards is migrating through Whittier Narrows towards Montebello Forebay. Regardless of whether EPA or the State of California are overseeing and funding operation of the remedy, EPA remains obligated to ensure that the objectives outlined in the ROD Amendment are met. If influent concentrations increase beyond the capability of the operating treatment facility, or if new contaminants are discovered, EPA will be required to take appropriate actions to improve the treatment facility such that the necessary groundwater extraction can continue.

WRD Comment No. 2. *EPA also needs to provide a plan to treat production wells in the Central Basin that may become affected by San Gabriel Valley contamination into the future. The liability for the protection and/or treatment of these wells should not fall onto the Central Basin stakeholders.*

EPA's Response. (See SEWC Comment No. 1).

WRD Comment No. 3. *EPA needs to address the San Gabriel Basin contamination that has already entered the Central Basin as depicted in Figures 1-2 and 1-3 in the WNOUFS Addendum. The methods to achieve this should be developed cooperatively between the USEPA and the Whittier Narrows Local Agency Workgroup. The Alternatives outlined in the Addendum are located well upstream of the lowest reaches of the plume of contamination emanating from the San Gabriel Valley. Though these locations are favorable in terms of protecting the Central Basin from further contamination, the existing contamination will not be remediated by these activities. The USEPA must develop a solution to remediate this contamination.*

EPA's Response. Considering the locations, depth intervals, and concentrations of contaminants that have already migrated into the Central Basin, EPA does not believe that active measures to remediate this contamination are warranted. Assuming that the selected remedy will cut off further migration of contaminants into the Central Basin, it is unlikely that the existing contamination will cause any additional Central Basin production wells not currently equipped with wellhead treatment systems to exceed MCLs. However, EPA will be continuing to monitor contaminant concentrations at the Whittier Narrows Dam. If contaminant concentrations increase to unacceptable levels EPA may implement a focused, fast-track temporary extraction system to protect Central Basin wells.

WRD Comment No. 4. *WRD and Central Basin pumpers have not only production wells to be concerned about, but a forebay into the entire Central groundwater basin is at potential risk. As a point of concurrence, Section 5.2 of the WNOUFS Addendum correctly states that migration of San Gabriel contamination into the Montebello Forebay area could impact the water supply for millions of Central Basin water users.*

EPA's Response. (See SEWC Comment No. 5)

WRD Comment No. 5. *Given the importance of the Montebello Forebay and associated water quality, EPA should provide local agencies the opportunity to enhance remediation by contributing towards incremental improvements in the remedial action. These improvements would include design modifications to enable cleanup levels well below the maximum contaminant level allowed by law and also the opportunity to optimize operations toward attainment of better contaminant removal. The WNOUFS Addendum should clearly identify the future decision points at which these opportunities would be analyzed.*

EPA's Response. EPA is not aware of any local stakeholders interested in contributing towards an enhancement of the remedial action. However, EPA welcomes such contribution. Parties interested in contributing towards remedy modifications should communicate to EPA as soon as possible. In 2000, EPA intends to complete design of the remedy. EPA will need to receive input from interested stakeholders in late 1999 to be able to incorporate modifications into the design specifications.

WRD Comment No. 6. *WRD strongly suggests that the USEPA continue its current momentum to implement remedial action in the Whittier Narrows as proposed in the WNOUFS Addendum and as communicated at the Joint Technical Meetings of the Whittier Narrows and South El Monte Operable Units. Any delay in implementing removal in the Whittier Narrows allows more contamination to migrate into the Central Basin and potentially into the Montebello Forebay. This situation has been studied by the USEPA since the late 1980s and it is now time for action.*

EPA's Response. (See SEWC Comment No. 2).

WRD Comment No.7. *The USEPA has stated in meetings and in the Draft WNOUFS Addendum that it will continue working towards implementation of remediation in the Whittier Narrows regardless of activities proposed by the El Monte / South El Monte Operable Units and/or the association South El Monte Operable Unit Participants (SEMOUPs). Statements to this effect have resulted in criticism from the SEMOUPs and the San Gabriel Basin Water Quality Authority that the USEPA is unwilling to cooperate in an integrated solution to both the Whittier Narrows and the South El Monte Operable Units. The USEPA could better communicate its objective of moving forward by stating that remediation will be required in the Whittier Narrows to capture and remove that contamination that is currently migrating toward and through the Narrows. Remediation of this contamination will be required regardless of what occurs in the South El Monte Operable Unit. If remediation in the South El Monte Operable Unit could begin today, the Central Basin would still face the migration of contamination that currently exists downstream of those remedial activities. The Final WNOUFS states that there are no scenarios where actions in the South El Monte OU would eliminate the need for some type of hydraulic barrier in Whittier Narrows to control migration into the Central Basin. Though useful, this statement is incomplete because of the lack of statement of justification. WRD continues to suggest inclusion of the text above for justification of moving forward with Whittier Narrows regardless of what occurs in the El Monte / South El Monte Operable Units.*

EPA's Response. Comment noted. EPA concurs with the WRD's statements regarding the need for containment in Whittier Narrows to address contamination already in the Narrows, regardless of upgradient actions. However, EPA does believe that making this type of minor modification to the Whittier Narrows OU Feasibility Study Addendum is unnecessary at this stage in the remedy implementation process.

WRD Comment No. 8. *On page 2 of Table 2-2, in the last entry in the middle column, the "Central Basin Board" should be replaced with "WRD".*

EPA's Response. Comment noted. At this time, EPA does not have any plans to re-issue the Whittier Narrows OU FS Addendum. This minor correction does not appear to warrant issuance of an errata sheet. However, if EPA makes any future use of Table 2-2 from the FS Addendum, this correction will be made.

2 Responses to Oral Comments

In this section, EPA provides responses to oral comments received at the public meeting held on November 19, 1998. EPA responded to a number of questions directly at the public meeting. This section provides responses to only those formal oral comments that were not fully addressed at the meeting. Formal oral comments were received from five parties: Mr. Ralph Webb, representing the Southeast Water Coalition (SEWC) Joint Powers Authority; Mr. Bob McVicker, representing the Water Replenishment District of Southern California; Mr. Jim Hamilton, South El Monte Property Owners Association (SEMPOA); Mr. Jim Glancy, SEWC and the City of Lakewood; and Mr. Bill Robinson, resident of West Covina. The full transcript of the public meeting is included in Appendix A of this ROD Amendment.

2.1 Response to Comments from Ralph Webb, representing SEWC

This section presents excerpts from Mr. Webb's oral statement and provides EPA's responses to each of Mr. Webb's comments. The entire text of Mr. Webb's statement can be found beginning on Page 36 of the meeting transcript available in the Administrative Record. The following text separates Mr. Webb's statement into individual comments and provides EPA's responses to each.

Mr. Webb's Comments, Transcript Page 36 Line 10 through Page 37 Line 10. *We appreciate the opportunity to comment on the Draft Whittier Narrows Operable Unit feasibility study addendum. SEWAC, as it's commonly known, was organized in 1991. Its primary mission has been to protect the Central Basin from VOC groundwater contamination migrating from the San Gabriel Basin through Whittier Narrows into the Montebello Forebay and the Central Basin.*

Oddly to say, we had an initial rocky relationship with EPA as we worked on this in the early 1990s, and SEWAC appreciates the effective working relationship that it has enjoyed in the last few years with the Environmental Protection Agency and other water authorities in the endeavor to protect the Central Basin groundwater resources.

While SEWAC has previously provided written comments on the Draft Whittier Narrows Operable Unit's feasibility study addendum, we think it's important to reaffirm its position in this public forum. SEWAC maintains a firm position with regard to the revised draft feasibility study.

One, EPA needs to provide a contingency action plan that will treat wells in the Central Basin that become affected by San Gabriel Valley contamination in the future.

EPA's Response. (See Section 1.5, SEWC Comment No. 1).

Mr. Webb's Comments, Transcript Page 37, Lines 11 through 14. *Two, SEWAC requests that EPA continue its current momentum to final implementation of remedial action in the Whittier Narrows as proposed in the draft feasibility study addendum.*

EPA's Response. EPA understands the concerns of Central Basin representatives regarding the threat to their water supply from San Gabriel Basin groundwater contamination and has been continuing to expedite implementation of the Whittier Narrows remedy. EPA is currently performing field investigations to gather critical pre-remedial design data and working towards agreements with local agencies, water purveyors, and water management agencies. Implementation of the remedy will require that EPA reach a number of complex, long-term agreements related to property access, water rights, and water use.

Mr. Webb's Comments, Transcript Page 37 Line 15 through Page 38 Line 11. *Three, EPA has stated in meetings and in the draft addendum that it will continue working towards implementation in Whittier Narrows regardless of activities proposed by the South El Monte Operable Unit and/or the association of South El Monte Unit participants. Statements of this effect have resulted in the SEMOU PRPs and the San Gabriel Basin Water Quality Authority that EPA is unwilling to cooperate in an integrated solution to both the Whittier Narrows and South El Monte Operable Units. EPA could better communicate its objective of moving forward by stating that remediation will be required in the Whittier Narrows to capture and remove that contamination that is currently migrating toward and through the Narrows. Remediation of this contamination will be required regardless of what occurs in the South El Monte Operable Unit. If remediation in the South El Monte Operable Unit could begin today, the Central Basin would still face the migration of contamination that currently exists downstream of those remedial activities.*

EPA's Response. EPA concurs with this comment and has reiterated this point in the FS Addendum and again here in this ROD Amendment. Because extensive contamination is already present in Whittier Narrows, no actions in the South El Monte OU would eliminate the need for a containment action in Whittier Narrows. EPA will assess the effect of any actions in the South El Monte OU on the Whittier Narrows remedy during remedial design.

Mr. Webb's Comments, Transcript Page 38 Line 12 through Page 39 Line 6. *Four, SEWAC will not accept any remedial activities that are designed to allow any contamination exceeding the maximum contaminant levels to enter the Central Basin from the San Gabriel Valley. SEWAC has not only production wells to be concerned about, but a Forebay into the Central groundwater basin which is at potential risk. The migration of San Gabriel Valley contamination in the Montebello Forebay could have a devastating impact on the groundwater basin. And, I would add that two production wells in the Montebello Forebay have already been contaminated by migrating VOC contamination from the San Gabriel Basin. In those cases EPA has not assumed responsibility for remediation although evidence clearly indicates the pollution emanated from the San Gabriel Valley Basin. Central Basin authorities were required to pay for remediation even though EPA and PRPs would bear that responsibility were the contamination to occur today.*

EPA's Response. EPA's objective for this remedy in Whittier Narrows is to provide containment of all groundwater containing contamination in excess of drinking water standards. EPA's implementation of the remedy is intended to stop the spread of contaminated groundwater beyond the extraction wells and into the Central Basin.

Mr. Webb's Comments, Transcript Page 39, Lines 7 through 11. *Five, any delay in implementing removal in the Whittier Narrows allow more contamination to migrate in the Central Basin. This situation has been studied by EPA in the late 1980s, and it is now time for action.*

EPA's Response. See EPA's response above to Mr. Webb's comments from Transcript Page 37 Lines 11 through 14.

Mr. Webb's Comments, Transcript Page 39, Lines 12 through 21. *Finally, SEWAC strongly urges that EPA continue operational responsibility for remediation facilities beyond the five years it's currently responsible for.*

SEWAC strongly urges EPA to continue to work with Whittier Narrows Local Agency Workgroup through the finalization of the WNOUFS addendum and the design and implementation of the remedial activities in the Whittier Narrows Operable Unit. Thank you.

EPA's Response. EPA is responsible for funding of the design and 90% of the construction and operations costs during the first 10 years of routine operations. The State of California is responsible for 10 percent of the construction and operations costs during the first 10 years and 100 percent of the operations costs beyond 10 years. EPA must adhere to this breakdown of funding responsibility. However, it should be noted that, regardless of the entity paying for operations, EPA remains responsible for ensuring that the provisions of this ROD Amendment are met as long as contamination remains in Whittier Narrows.

EPA also looks forward to continuing to work closely with Central Basin representatives throughout the remedy implementation process.

2.2 Response to Comments from Mr. Bob McVicker, representing the Water Replenishment District

This section presents Mr. McVicker's oral comments and provides EPA's responses to those comments. The entire text of Mr. McVicker's statement can be found beginning on Page 40 of the attached meeting transcript.

Mr. McVicker's Comments, Transcript Pages 40 and 41. *The Water Replenishment District is the regional groundwater agency mandated with the responsibility of protecting groundwater quality for 43 cities in southern Los Angeles County. Protection of the Central Basin groundwater quality is critical because it provides one-third of the water used by 3 million residents within the district's boundaries.*

As such, the WRD strongly urges expeditious implementation of the United States Environmental Protection Agency remedial action in the Whittier Narrows Operable Unit, as well as the South El Monte Operable Unit. These remedial activities provide the only way of assuring protection of the Central Basin through continued contamination from the San Gabriel Valley. In addition, as a member agency of the Southeast Water Coalition or SEWAC, WRD also supports the comments offered by SEWAC.

Addressing the contamination in Whittier Narrows is critical since it is located just upstream of the Central Basin. In addition, the area of the basin adjacent to the Narrows, the Montebello Forebay, is an area where all of the basin's major groundwater production aquifers merge to the groundwater surface.

Contamination from the San Gabriel Valley has already traveled through the Whittier Narrows and has reached the Montebello Forebay. Continued unchecked, the migration of contamination will potentially

proceed with increased levels into the spreading grounds in the Montebello Forebay. From there it can travel freely into the aquifers potentially affecting the entire Central Basin groundwater supply.

WRD appreciates the effective working relation it has developed between USEPA and other water entities to protect the Central Basin groundwater resource. The district looks forward to continuing this relationship to protect the Central Basin from the migration of contamination from the San Gabriel Valley. Thank you.

EPA's Response. Comments noted. EPA understands the concerns of Central Basin representatives regarding the threat to their groundwater supply from contamination migrating out of the San Gabriel Basin. EPA's goal is for the Whittier Narrows remedy to prevent contamination exceeding drinking water standards from migrating into the Central Basin. EPA has and will continue to expedite implementation of the Whittier Narrows remedy to protect the Central Basin groundwater resource. EPA also looks forward to continuing to work closely with Central Basin representatives throughout the remedy implementation process.

2.3 Response to Comments from Jim Hamilton, representing SEMPOA

This section presents Mr. Hamilton's oral comments and provides EPA's responses to those comments. The entire text of Mr. Hamilton's statement can be found on Page 42 of the attached meeting transcript.

Mr. Hamilton's Comments, Transcript Page 42. *I would like to ask the EPA, obviously South El Monte has shallow water that needs to be removed, and our pockets are pretty shallow down here. We're making a very serious effort to immediately start removal to the best of our ability along with SEWC's efforts. I wonder why some of those big bucks tucked away at EPA couldn't come in to solve this problem. Why don't we use some of that money to help relieve this problem? You have just said it is the principal contributor to the basin. Now we do what we can.*

I'd like you to give that some consideration and for the state water board to do the same thing. Thank you very much.

EPA's Response. The commentor appears to be asking that EPA (and the State of California Water Quality Control Board) consider funding the Whittier Narrows OU remedy themselves, without asking the South El Monte Property Owners to contribute. As indicated in this ROD Amendment and at the public meeting, this remedial action is a "fund-lead" project. This means that EPA is funding implementation of the remedy, with contributions from the State of California. However, EPA is obligated to try to recover its cleanup costs from the parties responsible for the contamination.

EPA is sensitive to the potential financial burden that paying for implementation of remedies in both the Whittier Narrows and South El Monte OUs would place on many of the smaller businesses in the South El Monte OU. As noted at the public meeting, EPA does take into account the "ability to pay" of the individual responsible parties when seeking cost recovery. It is still too early in the process for EPA to comment further on potential future cost-recovery actions.

2.4 Response to Comments from Jim Glancy, representing SEWC

This section presents Mr. Glancy's oral comments and provides EPA's responses to Mr. Glancy's comments. Mr. Glancy's statement can be found beginning on Page 42 of the attached meeting transcript.

Mr. Glancy's Comments, Transcript Pages 42 and 43. *In addition to the comments that were offered by the Southeast Water Coalition already this evening, there was a proposal made today this afternoon that I would like to address, and to say as the chairman of the technical advisory committee, SEWAC, that we support the early removal of shallow zone contamination from the Whittier Narrows area near San Gabriel Boulevard, which is the midpoint, as recently proposed by the South El Monte group and the San Gabriel Basin Water Quality Authority, so long as such a project does not delay the progress of the Whittier Narrows Operable Unit remediation as proposed. Thank you.*

EPA's Response. This comment refers to SEWC's support of a potential focused, interim early action to extract contaminated groundwater from the shallow zone at the corner of Rosemead and San Gabriel Boulevards north of Whittier Narrows Dam. EPA also supports implementation of the referenced project. The San Gabriel Basin Water Quality Authority has begun implementation of this shallow zone extraction and treatment project for the interim period during which EPA is working toward implementation of the full-scale remedy described in this ROD Amendment.

EPA does not anticipate that this interim project will delay progress of the overall remedy in any way.

2.5 Response to Comments from Mr. Bill Robinson, a resident of West Covina

This section presents Mr. Robinson's oral comments and provides EPA's responses to those comments. Mr. Robinson's statement can be found beginning on Page 43 of the attached meeting transcript.

Mr. Robinson's Comments, Transcript Page 43. *I'm testifying as a resident of West Covina. I just wanted to express my complaint to EPA about the sun setting of the San Gabriel Basin Water Quality Authority. I don't believe there's going to be enough progress to justify shutting down that agency, and I don't see any-- I'm not optimistic about regional board fully filling the void. That's concludes my comment. Thank you.*

EPA's Response. Comment noted. The San Gabriel Basin Water Quality Authority is an agency created by the State of California. EPA does not have any control over when the state sunsets this agency.

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Table 1: Summary of Chemicals of Concern and Exposure Point Concentrations in Groundwater

Groundwater Area	Chemical of Concern	Frequency of Detection	Minimum Concentration (ppb)	Maximum Concentration (ppb)	Exposure Point Concentration (ppb)	Statistical Measure
Shallow Zone - Most Contaminated	Chloroform	3/10	ND	0.35	0.35	Max
	1,1-DCE	9/10	ND	1.0	0.68	95% UCL
	1,2-DCA	2/10	ND	0.3	0.26	95% UCL
	1,4-Dioxane	2/2	1.0	6.5	6.5	Max
	PCE	10/10	38.5	245	149	95% UCL
	TCE	10/10	2.5	6.5	5.73	95% UCL
Shallow Zone	1,1-DCE	8/22	ND	0.4	0.40	Max
	PCE	22/22	3.0	51	23.4	95% UCL
	TCE	20/22	ND	4	2.45	95% UCL
Intermediate Zone	Chloroform	12/39	ND	2.0	0.59	95% UCL
	1,1-DCE	26/39	ND	0.9	0.60	95% UCL
	1,2-DCA	3/39	ND	0.2	0.20	Max
	PCE	39/39	0.3	170	41.4	95% UCL
	TCE	37/39	ND	17	5.70	95% UCL

Notes:
ND = non-detect
ppb = parts per billion or ug/L (micrograms per liter)
95% UCL = 95 percent upper confidence limit on the arithmetic mean groundwater concentration
Max = Maximum concentration detected in a specific groundwater area. Used as a default in place of the 95% UCL.

Table 2: Criteria Used to Evaluate Potential Groundwater Risks

Chemical of Concern	MCL	Risk-Based PRG = $1x10^{-6}$	Risk-Based Concentration = $1x10^{-5}$	Risk-Based Concentration = $1x10^{-4}$	Noncancer PRG HQ=1	EPA Region IX Tap Water PRG [$1x10^{-6}$ or HQ=1]
Chloroform	100	0.165	1.65	16.5	60.8	0.165
1,1-DCE	6	0.0456	0.456	4.56	54.8	0.0456
1,2-DCA	0.5	0.123	1.23	12.3	17.4	0.123
1,4-Dioxane	3*	6.11	61.1	611	NA	6.11
PCE	5	1.08	10.8	108	254	1.08
TCE	5	1.64	16.4	164	36.5	1.64

Notes:

*California action level
All concentrations are in part per billion (ppb) or ug/L.
MCL = maximum contaminant level.
PRG = preliminary remediation goal.
NA = not available

Table 3: Exceedances of MCLs, Carcinogenic PRGs, and Risk-Based Concentrations

Groundwater Area	Concentration Exceeds MCL	Concentration Exceeds $1x10^{-6}$	Concentration Exceeds $1x10^{-5}$	Concentration Exceeds $1x10^{-4}$	Combined Risk - All COCs
Shallow Zone - Most Contaminated	PCE TCE	Chloroform = 2.1×10^{-6} 1,2-DCA = 2.1×10^{-6} 1,4-Dioxane = 1.1×10^{-6} TCE = 3.5×10^{-6}	1,1-DCE = 1.5×10^{-5}	PCE = 1.4×10^{-4}	1.6×10^{-4}
Shallow Zone	PCE	1,1-DCE = 8.8×10^{-6} TCE = 1.5×10^{-6}	PCE = 2.2×10^{-5}		3.2×10^{-5}
Intermediate Zone	PCE TCE	Chloroform = 3.6×10^{-6} 1,2-DCA = 1.6×10^{-6} TCE = 3.5×10^{-6}	1,1-DCE = 1.3×10^{-5} PCE = 3.8×10^{-5}		6.0×10^{-5}

Table 4: Special Status Species that Occur or Could Occur at Whittier Narrows Flood Control Basin (USACE, 1998)

Species	Status
Invertebrates	
Greenest Tiger Beetle (Cicindela tranquebarica viridissima)	Category 1
Fish	
Arroyo Chub (Gila orcutti)	Sensitive
Santa Ana Speckled Dace (Rhynichthys osculus)	Sensitive
Santa Ana Sucker (Catostomus santaanae)	Sensitive
Amphibians	
Red-legged frog (Rana aurora draytoni)	Category 1
Southwestern Arroyo Toad (Bufo microscaphus californicus)	Endangered
Western Spadefoot Toad (Scphiopus hammondii)	Category 1
Reptiles	
Southwestern pond turtle (Clemmys marmorata pallida)	Category 1
San Diego horned lizard (Phrynosma coronatum blainvillei)	Sensitive
Coastal western whiptail (Cnemidorphorus tigris multiscutatus)	Sensitive
San Bernardino ringneck snake (Diadophis punctatus modestus)	Sensitive
Two-striped garter snake (Thamnophis hammondii)	Sensitive
Coastal rosy boa (Lichanura trivirgata rosafusca)	Sensitive
Coast patch-nosed snake (Salvadora hexalepis)	Sensitive
Birds	
Least Bell=s vireo (Vireo bellii pusillus)	Endangered
Peregrine falcon (Falco peregrinus)	Endangered
California horned lark (Eromophila alpestris actia)	Sensitive
California gnatcatcher (Polioptila californica)	Threatened
San Diego cactus wren (Campylorhynchus bruneicappilus couesi)	Sensitive
Tricolored blackbird (Agelaius tricolor)	Sensitive
Southern California Rufous crowned sparrow (Aimophila ruficeps)	Sensitive
White-faced ibis (Plegadis chihi)	Sensitive
Southwestern willow flycatcher (Empidonax trailii extimus)	Endangered
Horned grebe (Podiceps auritus)	Audubon blue list
Least bittern (Ixobrychus exilis)	Audubon blue list
American bittern (Botaurus lentiginosus)	Audubon blue list
Canvasback (Aythya valisineria)	Audubon blue list
Cooper=s hawk (Accipiter cooperii)	CDFG Sensitive
Red-shouldered hawk (Buteo lineatus)	Audubon blue list
Sharp-shinned hawk (Accipter striatus)	Audubon blue list
Northern harrier (Circus cyaneus)	Audubon blue list
Ferruginous hawk (Buteo regalis)	Sensitive
Osprey (Pandion haliaetus)	CDFG Sensitive
Common barn owl (Tyto alba)	Audubon blue list
Burrowing owl (Athene cunicularia)	CDFG Species of Special Concern
Bewick=s wren (Thryomanes bewickii)	Audubon blue list
Yellow warbler (Dendrocia petechia)	CDFG Species of Special Concern
Yellow-breasted chat (Icteria virens)	CDFG Species of Special Concern

Species	Status
Mammals	
San Diego black-tailed jackrabbit (Lepus californicus bennettii)	Sensitive
California leaf-nosed bat (Macrotis californicus)	Sensitive
Greater western mastiff bat (Eumops perotis californicus)	Sensitive
Spotted bat (Euderma maculatum)	Sensitive
Los Angeles little pocket mouse (Perognathus longimembris brevinasus)	Sensitive
San Diego desert woodrat (Neotoma lepida intermedia)	Sensitive
Northwestern San Diego pocket mouse(Perognathus[Chaetodipus]fallax fallax)	Sensitive
Southern grasshopper mouse (Onychomys torridus ramona)	Sensitive

1 Status
Endangered: Listed as a federally endangered species
Threatened: Listed as a federally threatened species
Category one: Taxa for which FWS has sufficient biological information to list as endangered or threatened.
Sensitive: Taxa for which existing information indicated that listing may be warranted, but for which substantial biological information to support a proposed rule is lacking
Audubon blue list: The Audubon Society's watch list of species considered to be declining or threatened. (Tate 1986)
CDFG Endangered: Listed as endangered by the State of California
CDFG Sensitive: Listed as sensitive by the State of California
CDFG Species of Special concern: Taxa with populations declining seriously or otherwise highly vulnerable to human developments.

Table 5: Chemical-Specific ARARs for Chemicals of Concern

Compound	ARAR ug/l	Source
1,1-Dichloroethane	5	California MCL
1,1-Dichloroethene	6	California MCL
1,1,1-Trichloroethane	200	Federal MCL
1,2-Dichloroethane	0.5	California MCL
Chloroform[1]	100	Federal MCL
cis-1,2-Dichloroethene	6	California MCL
1,4-Dioxane	3	California action level
Ethylbenzene	700	Federal MCL
Styrene	100	Federal MCL
Tetrachloroethene	5	Federal MCL
Trichloroethene	5	Federal MCL
Toluene	150	California MCL
Xylenes, total	1,750	California MCL

Table 6--Option A (North of Whittier Narrows Dam)
Detailed Costs Estimates for the Selected Remedy
Whittier Narrows Operable Unit - Interim ROD

Component		Quantity	Unit	Unit Cost	Cost[1]
Capital Costs (Including Engineering, Administration, and Contingencies)					**Capital Costs**
Extraction Wells					
	Shallow Wells (approx. 100 ft. deep)	3	ea.	$113,000	$ 339.000
	Intermediate Wells (approx. 350 ft deep)	3	ea.	$263,000	$ 789.000
Treatment Facility (Air Stripper w/LGAC Polishing)					
	Treatment Plant (Capacity - 9,000 gpm)	1	ea.	$5,737,500	$ 5,737.500
	Building Pad for Treatment Facility	1	ea.	$148,000	$ 148.000
Pipelines					
	16-inch Pipelines from Wells	1,900	lf.	$112	$ 213.000
	18-inch Pipelines from Wells	1,200	lf.	$129	$ 155.300
	24-inch Pipelines from Wells	500	lf.	$173	$ 86.300
	27-inch Pipelines from Wells	1,550	lf.	$223	$ 345.400
	27-inch Pipelines to Purveyors	5,400	lf.	$208	$ 1,124.600
	27-inch Pipeline Across San Gabriel River	1,000	lf.	$395	$ 395.300
	Pressure Reducing Valve	1	ea.	$17,000	$ 17.000
Pumps					
	Shallow Extraction Well Pumps- 800 gpm	3	ea.	$14,375	$ 43.100
	Intermediate Extraction Well Pumps- 2,200 gpm	3	ea.	$40,250	$ 120.800
	Dishcharge Pump to Purveyors- 4,500 gpm	3	ea.	$41,675	$ 125.000
	Chlorination Unit	1	ea.	$40,400	$ 40.400
Monitoring Program					
	First Year Water Level Monitoring	1	ls	$13,000	$ 13.000
	Piezometers (1 shallow and 1 deep)	1	ls	$46,000	$ 46.000
	Total Capital Costs				**$ 9,739,000**
Re-Capitalization (Incl. Engineering, Administration and Contingencies)					**Present Worth Costs**
Extraction Wells- $34,000/well every 10 years		6	ea.	$34,000/10yrs	$ 101.000
Treatment Facility- $741,000 every 15 Years		1	ea.	$741,000/15 yrs	$ 365.000
Conveyance System Pumps- $231,000 every 15 years		1	ls	$263,000/15 yrs	$ 127.000
Monitoring Program- $6,000 every 10 years		1	ls	$6,000/10 yrs	$ 6,000
	Total NPV of Re-Capitalization Costs				**$ 599,000**
Annual Operation and Maintenance Costs					
(Long-Term Average Extraction Rate of 7,500 gpm Assumed)			**Unit Costs**	**Annual Costs**	**Present Worth Costs**
Treatment Facility- incl. power, carbon, labor, and maint.		1	$343,000	$343,000	$ 5,271.900
Pipeline Maintenance		1	$9,000	$9,000	$ 138,300
Extraction Well Pumps (avg. unit costs)		6	$22,667	$136,000	$ 2,090,300
Treatment Plant Discharge Pumps/Maint./Chlorine		1	$362,000	$362,000	$ 5,563,900
Recovered O&M Costs from Purveyors ($40/af)		12,098	$40	($484,000)	$ (7,439,100)
Monitoring Program		1	$166,000	$166,000	$ 2,551,400
	Subtotal Annual O&M Costs			**$532,000**	
	Contingency O&M Costs (15%)			$80,000	
	Total Annual O&M Costs			**$612,000**	
	Total Discounted O&M Costs[1]				$ 9,408,000
	Total Capital Costs				**$ 9,739,000**
	Total Present Worth Costs				**$ 19,746,000**

Notes

(1) Based on 30-year project and 5% discount rate.
Capital cost estimates are not discounted because the construction work will be performed in the early stages of the project. O&M costs are reported as present worth estimates given a 5% discount rate for a 30 year duration. Cost estimates are based on extraction rates and influent quality estimates that may be refined during remedial design. Cost estimates are estimated to be within a +30% -50% accuracy range.

ls. = lump sum, lf.= linear foot, ea. = each

Table 6--Option B (South of Whittier Narrows Dam)
Detailed Costs Estimates for the Selected Remedy
Whittier Narrows Operable Unit - Interim ROD

Component		Quantity	Unit	Unit Cost	Cost[1]
Capital Costs (Including Engineering, Administration, and Contingencies)					**Capital Costs**
Extraction Wells					
	Shallow Wells (approx. 100 ft. deep)	3	ea.	$94,000	$ 282,000
	Intermediate Wells (approx. 350 ft deep)	3	ea.	$249,000	$ 747,000
Treatment Facility (Air Stripper w/LGAC Polishing)					
	Treatment Plant (Capacity - 9,000 gpm)	1	ea.	$3,339,000	$ 3,339,000
Pipelines					
	18-inch Pipelines from Wells	2,150	lf.	$123	$ 263,400
	24-inch Pipelines from Wells	500	lf.	$173	$ 86,500
	27-inch Pipelines from Wells	100	lf.	$194	$ 19,400
	30-inch Pipeline to Rio Hondo	5,260	lf.	$259	$ 1,362,300
Pumps					
	Shallow Extraction Well Pumps- 800 gpm	3	ea.	$14,375	$ 43,100
	Intermediate Extraction Well Pumps- 2,200 gpm	3	ea.	$40,250	$ 120,800
	Dishcharge Pump to Purveyors- 4,500 gpm	1	ea.	$24,438	$ 24,400
Monitoring Program					
	Two Additional Multiple Port Wells	2	ea.	$148,000	$ 296,000
	First Year Water Level Monitoring	1	ls	$13,000	$ 13,000
	Piezometers (1 shallow and 1 deep)	1	ls	$46,000	$ 46,000
	Total Capital Costs				**$ 6,643,000**
Re-Capitalization (Incl. Engineering, Administration and Contingencies)					**Present Worth Costs**
Extraction Wells- $34,000/well every 10 years		6	ea.	$34,000/10yrs	$ 101,000
Treatment Facility- $615,000 every 15 Years		1	ea.	$615,000/15 yrs	$ 296,000
Conveyance System Pumps- $151,000 every 15 years		1	ls	$151,000/15 yrs	$ 73,000
Monitoring Program- $6,000 every 10 years		1	ls	$6,000/10 yrs	$ 6,000
	Total NPV of Re-Capitalization Costs				**$ 476,000**
Annual Operation and Maintenance Costs					
(Long-Term Average Extraction Rate of 7,500 gpm Assumed)			**Unit Costs**	**Annual Costs**	**Present Worth Costs**
Treatment Facility- incl. power, carbon, labor, and maint.		1	$195,000	$195,000	$ 2,997,200
Pipeline Maintenance		1	$7,000	$7,000	$ 107,600
Extraction Well Pumps (avg. unit costs)		6	$21,333	$128,000	$ 1,967,400
Treatment Plant Discharge Pumps/Maint.		1	$32,000	$32,000	$ 491,800
Monitoring Program		1	$166,000	$166,000	$ 2,551,400
	Subtotal Annual O&M Costs			**$528,000**	
	Contingency O&M Costs (15%)			$79,000	
	Total Annual O&M Costs			**$607,000**	
	Total Discounted O&M Costs[1]				$ 9,331,000
	Total Capital Costs				**$ 6,643,000**
	Total Present Worth Costs				**$ 16,450,000**

Notes

(1) Based on 30-year project and 5% discount rate.
Capital cost estimates are not discounted because the construction work will be performed in the early stages of the project. O&M costs are reported as present worth estimates given a 5% discount rate for a 30 year duration. Cost estimates are based on extraction rates and influent quality estimates that may be refined during remedial design. Cost estimates are estimated to be within a +30% -50% accuracy range.

ls = lump sum. lf.= linear foot. ea. = each

FIGURE 1

LOCATION MAP OF WHITTIER NARROWS OPERABLE UNIT

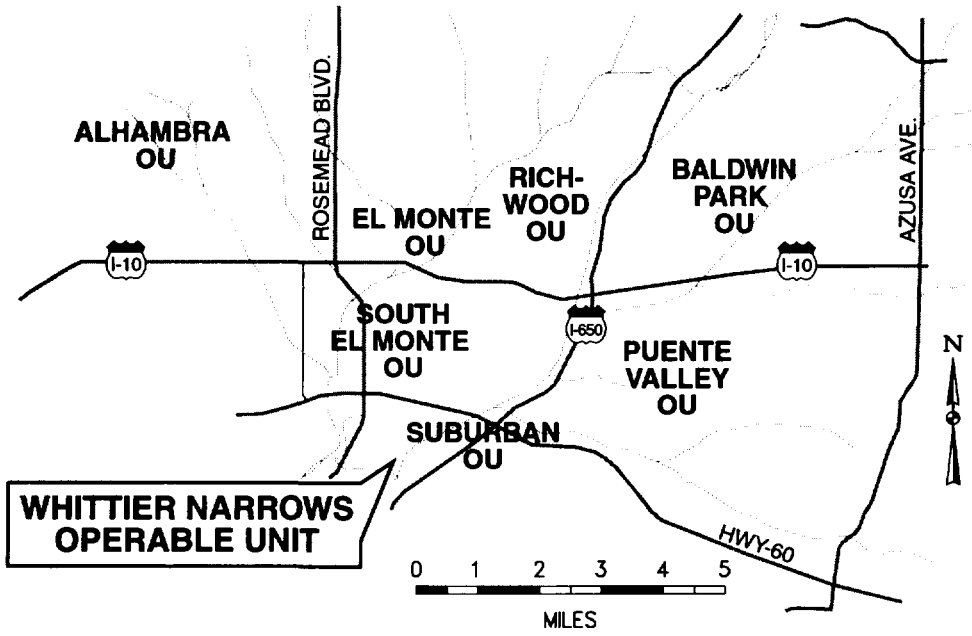
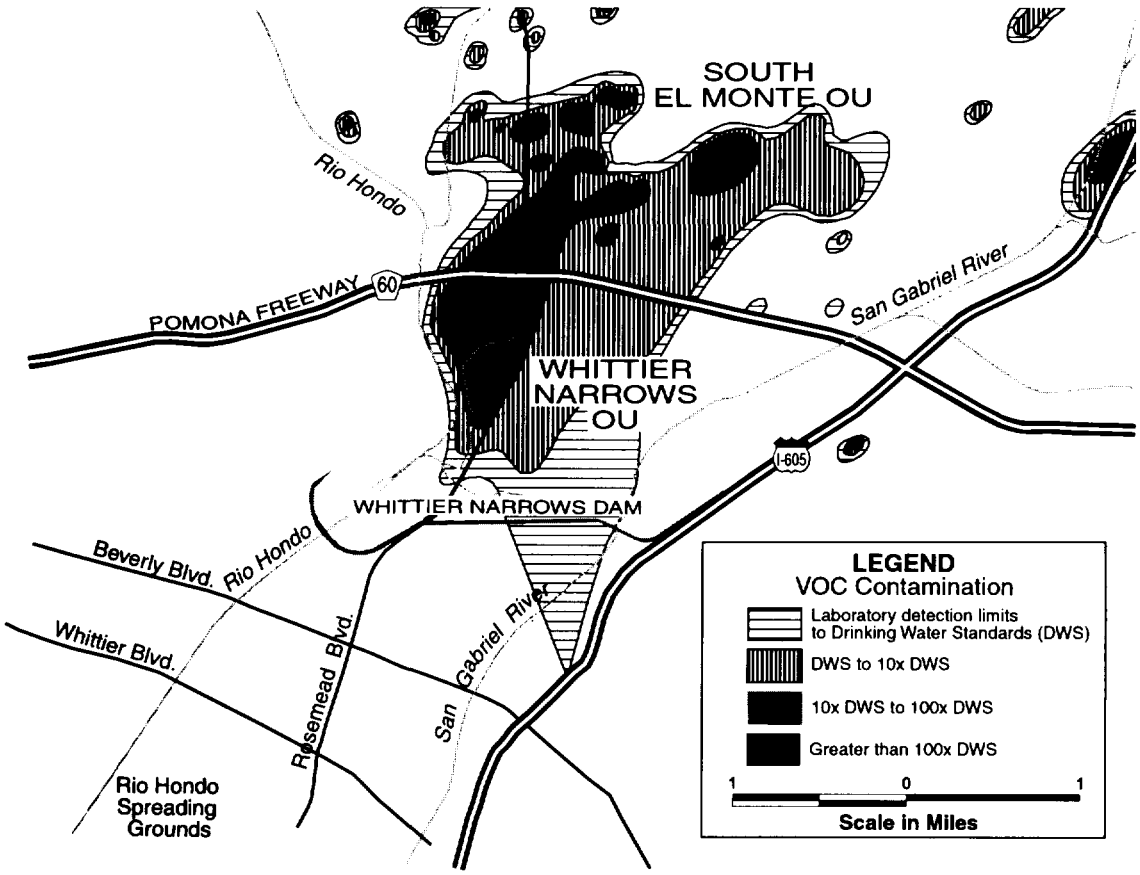


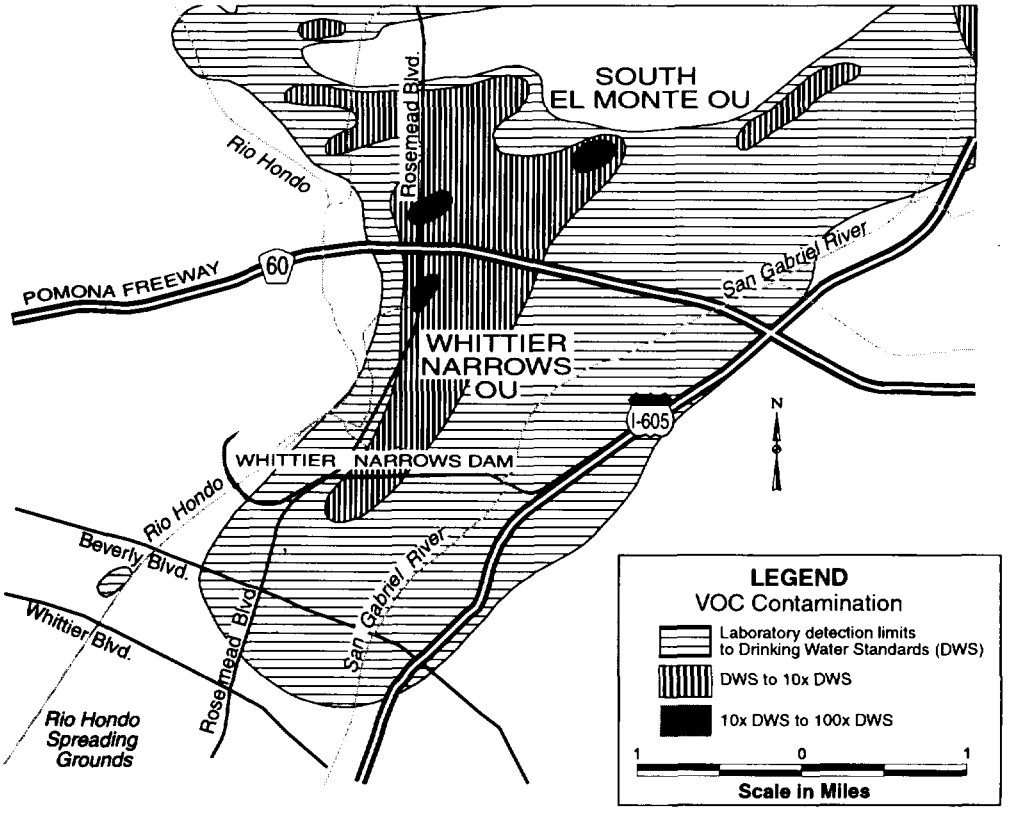
FIGURE 2

1997 SHALLOW VOC CONTAMINATION



VOC Contamination in Shallow Zones

FIGURE 3
1997 DEEP VOC CONTAMINATION



VOC Contamination in Intermediate Zones